British Geological Survey
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Inventory of scientifically significant features in cave SSSI's (Southern England)

Lands and Resources Programme.
Commissioned Report CR/02/034N

BRITISH GEOLOGICAL SURVEY

COMMISIONED REPORT CR/02/034 N

Inventory of Scientifically Significant Features in Cave SSSI's. (Southern England)

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Key words

Cave, Mendip Hills, SSSI, Karst, Stalagmite

Bibliographical reference

FARRANT, A R; LOWE, D.J. Inventory of scientifically significant features in cave SSSIs. *British Geological Survey Commisioned Report*, CR/02/034. pp.

Keyworth, Nottingham British Geological Survey 2002

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Acknowledgements

This document is drawn heavily, and quoted extensively, from the various caving guide books and cave surveys produced by caving clubs and societies. Due acknowledgement is given to those individuals and clubs that produced the original surveys.

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Inventory of Scientifically Significant Features in Cave SSSIs

Sites in Southern England

For each site (referred to by its SSSI and GCR names) each major and/or significant cave system is inventoried by way of an annotated outline map and appropriate text. Particular attention is paid to the more important and/or extensive groups of calcite speleothems and also the notable sections of undisturbed clastic sediments where known or identified. For both materials, their present state (as of 2001) is noted, but any monitoring exercise will have to start with a more detailed description for reference purposes. Locations of all significant sediments and deposits are indicated on the outline surveys.

The scientific value of many caves lies in their passage morphology, as carved into the solid limestone. With rare exceptions, these features are not fragile and are barely impacted from cavers' visits. The main features are identified in this report, but without any attempt or need to detail most of them with reference to any future monitoring. For each site, the overall geological and geomorphological values are outlined only briefly by way of introduction. The reader is referred to Volume 12 of the Geological Conservation Review (Waltham et al., 1997), which contains fully referenced descriptions and evaluations of the geomorphological evolution of the sites. The results of explorations and research since 1997 are summarised in appropriately greater detail. The only references cited are those that post-date 1997 or are not cited in the GCR volume's extensive bibliography.

Within nearly all the sites there are many smaller caves and potholes that add collectively to the scientific value of the site. Except for any with special significance, these are not described in detail but are all listed in Table 1 and described in Barrington and Stanton, (1977) and in Limestones and Caves of Wales (Ford, 1989). In particular, many sites are only of archaeological interest, and these are noted in Table 1, but are not dealt with here, as in many cases the entire cave is of interest. Furthermore, many caves contain small patches of undisturbed sediment and odd stalagmite deposits, whose scientific value is hard to quantify. Commonly, a stalagmite deposit may have little aesthetic value (for example if covered in sediment), but its potential scientific value may not be revealed unless a specific study is undertaken. Only some of the caves included in this report have had proper detailed geomorphological surveys, and even these will not have identified or reported all the significant features.

Table 1. Cave SSSI Sites

SSSI Site	Significant caves within the SSSI boundary.	Cave with significant deposits (see note 1).	Archaeological sites (see note 2).	Cave needing additional fieldwork (see notes 3& 4).
Cheddar Gorge and Charterhouse	Gough's Cave; Cox's Cave; Long Hole; Great Oones Hole; Reservoir Hole; Sun Hole; Cooper's Hole; Bone Hole; Longwood Swallet; GB Cavern; Charterhouse Cave; Manor Farm Swallet; Grebe Swallet; Tynings Barrow's Cave; Waterwheel Swallet; Rhino Rift; Upper Flood Swallet; Saye's Hole; Sun Hole; Cooper's Hole; Totty Pot	Gough's Cave; GB Cavern; Longwood Swallet; Charterhouse Cave; Manor Farm Swallet; Grebe Swallet; Reservoir Hole	Sun Hole; Saye's Hole; Cooper's Hole; Bone Hole; Totty Pot	Reservoir Hole (restricted survey)
St Dunstan's Well Catchment	Stoke Lane Slocker; Shatter Cave; Hillier's Cave; Hillwithy Cave; Fairy Cave; Fernhill Quarry Cave; W/L Cave; Browne's Grotto	Stoke Lane Slocker; Shatter Cave; Hillier's Cave; Hillwithy Cave; Fairy Cave;		Shatter Cave; Hillier's Cave; Hillwithy Cave; Fairy Cave; Stoke Lane Slocker
Upper Wye Gorge	Merlin's Cave; King Arthur's Cave; The Dropper; Lady Park Wood Cave, Slaughter Stream Cave, Big Sink	Lady Park Wood Cave; Slaughter Stream Cave	Merlin's Cave; King Arthur's Cave	The Dropper; Slaughter Stream Cave, Big Sink
Crook Peak to Shute Shelve Hill	Shute Shelve Cavern; Picken's Hole; Coral Cave	Shute Shelve Cavern	Picken's Hole; Coral Cave	
Priddy Caves and Priddy Pools	Swildons Hole; Priddy Green Sink; Eastwater Cavern; Hunter's Hole; St Cuthbert's Swallet	Swildons Hole; St Cuthbert's Swallet		Eastwater Cavern
Lamb Leer	Lamb Leer Cavern	Lamb Leer Cavern		Lamb Leer Cavern
Wookey Hole	Wookey Hole; Rhinoceros Hole; Badger Hole; Hyaena Den	Wookey Hole	Rhinoceros Hole; Badger Hole; Hyaena Den	Wookey Hole (beyond Chamber 9)
Thrupe Lane Swallet	Thrupe Lane Swallet			Thrupe Lane Swallet
Banwell Caves	Banwell Stalactite Cave; Banwell Bone Cave;	Banwell Stalactite Cave	Banwell Bone Cave;	Banwell Stalactite Cave
Burrington Coombe	Read's Cavern; Bos Swallet; Bath Swallet; Drunkard's Hole; Rod's Pot; Sidcot Swallet; Goatchurch Cavern; Pierre's Pot; Aveline's Hole; East Twin Swallet; Lionel's Hole		Bos Swallet; Aveline's Hole	

Note 1. This column includes all caves with significant scientifically interesting deposits; based on current information and state of knowledge. These are the caves that are included in this contract. These do not include sites where the passage geomorphology is the main SSSI criteria; for example many of the Burrington caves; Beachy Head Cave and Thrupe Lane Swallet.

Note 2. Many smaller caves are archaeological sites and as such the entire cave constitutes a scientifically important deposit. Examples include many smaller caves in Cheddar Gorge; King Arthur's Cave and Banwell Bone Cave. Surveys of these caves are not included.

Note 3. Some caves have never been studied systematically by suitably qualified persons; and thus require additional survey work to produce an adequate inventory of scientifically important deposits.

Note 4. Many caves contain speleothem and sediment banks that may be important but remain undated. Commonly these deposits are not obvious and will not be identified prior to specific fieldwork. Thus, exclusion from this survey does not imply that a cave has no significant deposits; more that little or no serious scientific work has been undertaken on the deposits within the cave and their scientific value remains unquantified.

Cheddar Gorge – Charterhouse SSSI

GB Cavern & Charterhouse Swallet

GB Cavern and the neighbouring Charterhouse Cave (ST 475562), form an integrated swallet cave system located 2 km north of the Cheddar Risings on the Lower Limestone Shale-Black Rock Limestone boundary. GB Cavern is one of the most intensively studied caves in Britain and has numerous fine speleothem deposits and sediment sections. Total passage length exceeds 2 km and the cave descends steeply to a depth of 134 m. The upper portion of the cave is a network of classic inlet passages that unite in the Gorge, a superb and very large vadose canyon that descends steeply to a choke. In the Entrance Series, a high-level phreatic passage (Double Passage) almost certainly links with Chiaroscuro Passage in Charterhouse, but is currently choked. Two high-level abandoned phreatic distributary passages lead off along strike from the Gorge. The first, Bertie's Pot, is choked after a short distance, the second, Bat Passage extends to a choke after 200 m. Charterhouse Cave, located 300 m to the east, has a similar morphology to that of GB to which it is linked genetically. A series of small vadose inlet passages drain into a large chamber before terminating in collapse. The geomorphology of GB Cavern has been studied in detail (Waltham et al., 1997).

The multiplicity of inlet passages reflects the large number of sinks that the stream has utilised through time, caused by the infilling of former sinks by clastic material. Thick clastic deposits are characteristic features of both GB Cavern and Charterhouse Cave, and are also present in many other swallet caves on Mendip. These sediments consist of coarse angular sandstone and limestone gravels, commonly cemented by overlying speleothem and locally forming terraces along the passage margins. In places, renewed stream erosion has undercut these cemented gravels, leaving perched false floors. Under current climatic conditions, the gravel deposits are being eroded by stream action, but external sediment delivery rates are low, although much mud was washed in by the floods of July 1968. Thus, it is generally accepted that the gravels were emplaced under periglacial conditions by the transport of surface material into the cave. Much of this sediment was probably reworked material derived from interglacial weathering. Some of the finer grained ponded deposits have been dated using palaeomagnetic stratigraphy. The associated speleothem was deposited in the intervening warmer periods. In GB Cavern, previous work has identified at least 8 major gravel fills, most within the entrance series and in the Gorge, may of which are interbedded or capped with speleothem, some of that have been dated by U-series and Electron Spin Resonance methods. These data demonstrate that most of the gravels were emplaced during nival (snow-melt) dominated climate regimes with the earliest being deposited between 900,000 and 750,000 years ago, but many of the data are as yet unpublished.

Access is controlled by the Charterhouse Caving Company and a key and permit system is in operation. The cave has an operational conservation management plan, and conservation

work in currently in progress. Most of the scientifically important sites, especially the stalagmite and flowstone deposits, are very robust and have not suffered any deterioration over the last 70 years.

GB Cavern – sites on the survey

1. Entrance. Just inside the entrance, at roof level is a well-exposed, but often overlooked exposure of a galena (PbS) vein. Much galena can be found in the floor sediment just inside the entrance. A large corroded stalagmite flow in the roof here has been dated using both U-series and ESR methods and provides evidence of the extreme antiquity of passages in this part of GB.

2. A short distance further in, a well developed classic keyhole passage develops. The upper phreatic tube is choke by stalagmite-cemented coarse gravel fill, with overlying laminated mud deposits, that have been dated by palaeomagnetic methods. The stalagmite has been dated using U-series methods. The lower part of this fill, infilling a vadose trench, has been eroded and is well-exposed.

3. Grotto. This small chamber used to have numerous helictites, but the real interesting feature is the roof, which is composed of cemented gravel fill with cobbles of Old Red Sandstone. Beyond, at the base of the ladder into Double Passage, numerous examples of cemented false floors can be seen, representing many stages of sediment infill, cementation and erosion. Numerous broken fragments of pure white aragonitic stalagmite occur within the fill. The climb up into Double Passage brings one up onto the top false floor deposit, which here is covered in stalagmite. A mud bank at the far end has been dated using palaeomagnetic methods.

4. Double Passage. At the climb up into Double Passage from the Upper Grotto is a complex sequence of gravel, sand and flowstone deposits. An ESR sample was taken from the base of the stalagmite in this sequence, directly above the underlying gravel. Immediately above and behind the climb is another sediment section dated using palaeomagnetic methods. This was from red clay underlying white mammilated aragonitic flowstone coating the walls. Another ESR sample was obtained from the top of a 3.5 m section of very complex stratified flowstone at the 10' Pot in the Devil's Elbow route.

5. In the east wall of the Boulder Chamber is a deposit consisting of 1 m of gravels overlain by 3 m of complex laminated flowstone (dated using U-series methods) and 1 m of laminated mud. The streamway between here and the Gorge is a classic vadose stream passage.

6. At the head of the Gorge is an obscure rift in the west wall, with some dated flowstone. The area is liberally covered with mud deposited as a mudflow after the 1968 floods. This mudflow is probably the best historic example in Britain of a mass-movement deposit in a cave caused by surface collapse. The link to the collapse doline above (which is now fenced off) is choked by old cars, which were dumped here by the farmer after the 1968 floods.

7. The Gorge. This passage is one of the largest passages on Mendip and a classic vadose canyon. Remnants of the 1968 mudflow deposits extend much of the way down the Gorge, as far as the junction with Mud Passage.

8. At the base of the last climb in Mud Passage, an interesting deposit of red clay partially eroded by drip water entering from the roof, occurs at floor level. It is capped by a stalagmite deposit with fragments of limestone breakdown cemented within.

9. At this point the first well-exposed examples of extensive false floor deposits occur on either side of the passage. These consist of coarse poorly-sorted gravels cemented by stalagmite, with clasts of limestone and Old Red Sandstone. These deposits represent former passage infills, deposited during periglacial periods, and much has been removed by subsequent stream erosion.

10. Bridge Limb. This section is probably one of the best sediment sections on Mendip. Here, a 3 to 4 m high deposit of coarse gravel with a thick interbedded stalagmite layer in the middle is capped by modern stalagmites. The gravels, with clasts of Old Red Sandstone, represent cold phase deposits, with the interbedded stalagmite representing intervening warm phase deposits. The stalagmite layer has been dated using ESR and U-series methods to 52 ka. The Bridge itself is a fine example of a false floor extending across the passage. Numerous other excellent stalagmite formations occur in this area.

11. White Passage. This large passage has numerous 'poached egg' type stalagmites on the passage floor, some of that have been dated using U-series methods. Excellent helictites occurs adjacent to the Bridge. The lower part of the passage merges onto the continuation of the sediment bank that forms the Bridge Limb.

12. Art Gallery. This little-visited area has numerous fine stalagmites, some of that have been dated. The Art Gallery has high-level mud deposits, that have been dated using palaeomagnetic methods.

13. Main Chamber and the Gallery. This is a continuation of the Bridge Limb sediment bank and consists of a large bank of coarse poorly-sorted gravel and breakdown overlain by Holocene stalagmite deposits, some of that have been dated. The Main Chamber is the largest

chamber on Mendip and has some superb stalactites in the roof. The floor is covered in both fluvial deposits and breakdown debris, including very large boulders of stalagmite.

14. This area has numerous stalagmite deposits, some of that have been dated.

15. The Hall. This large chamber has some interesting stalagmite deposits on its northern side, some of that have been dated. The chamber is oriented along the line of the Hall Fault.

16. Bertie's Pot. The lower end of this vadose passage has some stalagmite deposits in a rift. These have been dated using ESR and U-series methods. The sediments in the floor consist of coarse fluvial sand and gravel with Old Red Sandstone cobbles.

17. The fine mud banks below the climb to Ladder Dig were deposited overnight during the 1968 floods, infilling the passage beyond which used to extend for another 100 m. This provides a fine example of the dynamic nature of fluvial cave sediments. The sediment is now been re-excavated by the stream, exposing new sediment sections and gradually revealing the blocked passage. Just upstream, at the base of the Oxbow are some excellent helictites.

18. Ladder Dig. This high-level abandoned phreatic distributary passage has some interesting stalagmite-cemented sediments that were exposed during digging to gain access to the Ladder Dig extensions. This has provided a small but interesting exposure through these deposits, that have been dated using U-series methods.

19. At the far end of Ladder Dig the passage breaks out into a larger but choked fossil phreatic passage with some superb helictites in the roof. The sediment fill here (dug out and stacked) has some large clasts of Old Red Sandstone.

20. Great Chamber. This is one of the best examples of a collapse chamber on Mendip, and is probably the top of the collapse seen at the lower end of the main streamway. The huge pile of breakdown has some superb stalagmite deposits, some of that have been dated. In places this boulder choke still moves occasionally.

21. Bat Passage. So named after some bat bones were found, this superbly decorated passage is a fine example of a phreatic passage. It has some impressive flowstone floors and crystal pools that are taped off. Some of the stalagmites have been dated using U-series methods.

22. At the far end, Bat Passage degenerates into a series of muddy, but geomorphologically interesting paragenetic rifts with coarse fluvial sediments that have been dug out to reveal more than 60 m of rifts. This lower dug section has successfully bypassed an upper rift with superb stalagmite formations.

To summarise, GB Cavern is one of the most well studied caves in Britain, because of its superb geomorphology, excellent flowstone and sediment deposits and ease of access. Numerous studies have been undertaken in the cave in all aspects of cave and karst science, including dye tracing and hydrogeological studies, groundwater hydrology and geochemistry, palaeoclimate studies of speleothems, speleogenesis and landscape evolution studies.

Charterhouse Cave

This cave has a very similar morphology to that seen in GB Cavern but on a smaller scale. A series of inlet passages unite in The Citadel, beyond which a stream passage shortly chokes. The cave has some fine stalagmite deposits and, like GB Cavern, many well-exposed sediment deposits, some forming false floors and bridges. The sequence of development is closely linked to that of GB Cavern, to which it is linked genetically via the choked Double Passage – Chiaroscuro Passage connection, although there is no physical link at present. However, no dating has been undertaken on any of the deposits in the cave.

The cave's recent discovery and access controlled under a leader scheme has protected most of the more delicate features from damage. Access is via the Charterhouse Caving Company and a key and permit system is in operation.

Charterhouse Cave – sites on the survey

23. Midsummer Chamber. This high-level chamber contains the most spectacular fill in the cave. It consists of well-rounded Old Red Sandstone cobbles in a cemented sandy matrix, at least 4 m thick. Several prominent false floors occur in the vicinity of the Wallows, just downstream. The passage beyond Midsummer Chamber (Forbidden Passage) is taped off to preserve the exquisite stalagmite deposits in the chamber.

24. Splatter Chamber. This chamber contains a distinctive fill that appears to have come from a surface sink in this area. There is some evidence that miners may have entered this part of the cave. The distinctive mud formations result from the removal of this fill.

25. The Citadel. This large chamber is morphologically very similar to the Main Chamber in GB Cavern. A series of thin false floors occurs on the chamber walls and much of the floor is occupied by a cemented Old Red Sandstone gravel. A particularly fine cluster of 'poached egg' stalagmites known as 'The Blobs' occurs in the centre of the chamber. Both passages entering this chamber from Splatter Chamber have some exposures of the sediment fill.

26. Chiaroscuro Passage. This area contains several interesting fill deposits interbedded with thick stalagmite flowstones at the base,and subaqueous pond calcites at the top. Some of the

stalagmite in this fill is similar to that seen in Double Passage in GB Cavern to which it is probably related genetically. The area is a key site for future research.

27. Grotto of the Singing Stal. This area has a spectacular section through several metres of flowstone and numerous cemented boulders.

Longwood Swallet – August Hole (ST 486557)

Longwood Swallet comprises a steeply descending network of small vadose passages (including August Hole) which unite along a fault-guided rift. At the base of the rift is the main streamway, which can be followed upstream to a choke not far below the surface and downstream past an inlet to a narrow passage and sump. Its geomorphological evolution has been studied in detail. Initial phreatic erosion was followed by a fall in the water-table by 56 m which initiated vadose erosion. Three further aggradational and two renewed vadose incision stages corresponding to further drops in base-level occurred. Three former water-table levels in Longwood; at 138-141 m, 120-123 m and 90-93 m can be recognised. The modern phase of vadose erosion is graded to a water-table at 40 m. Although there is much of geomorphological interest in the cave, there are relatively few clastic or stalagmite deposits, except in the Fault Grottos and the Oxbows.

Access is controlled by the Charterhouse Caving Company and a key and permit system is in operation. Most of the scientifically interesting features are off the main tourist routes and are generally quite robust.

Longwood Swallet – sites on the survey

1. Entrance series. This area of the cave contains a series of classic vadose inlets, most of which are still active. Remains of a coarse gravel fill, capped with a 30 cm-thick stalagmite flow occur in places around the junction of August Hole and Longwood Swallet, just beyond the second pitch. A second fill occurs high in the roof of the Great Rift.

In August Hole (the 'Drainpipe'), the passage has remains of at least two sediment fills capped by stalagmite.

2. Great Chamber. This is the largest chamber in the cave, formed along a major fault plane that also governs the location of the Fault Chamber, and the Fault Chamber Grottos. Some stalagmite flows occur on the western wall. The lower part of the chamber is composed mainly of breakdown. The now-abandoned Rhal Passage enters at roof level, and is a classic example of a vadose inlet, which is well decorated at the start. In Waterfall Chamber there are interesting partially eroded fill deposits, containing stalagmite, limestone and quartzite fragments. Stream deposits in the south and east corners of Great Chamber are coated in thick stalagmite and finely laminated mud.

3. Swing Pitch, Fault Chamber and the Fault Chamber Grottos. Swing Pitch is developed along the line of a well-exposed steeply dipping fault plane, with superb associated gouge. These can be seen at the base of the pitch and there are also abundant exposures of fill material on the walls. The Grottos are well decorated in places and contain some interesting sediment deposits, especially in the lower chamber where they are overlain by a stalagmite deposit, as yet undated.

4. Upstream Series. These are fine examples of bedding-guided breakdown dominated vadose inlet passages. Some sediment and stalagmite deposits occur in places, notably at the top of the Dry Gallery, where up to 60 cm of sand occurs. In the underlying Stream Gallery, (again breakdown dominated) the eroded remains of a sediment fill 3.6 m thick occur.

5. Here are well-exposed thick (4.5 m) deposits of sediment fill, capped by up to 30 cm of stalagmite (probably coeval with the sediment fill downstream). This has not been dated.

6. Downstream Series: Main stream passage. Some interesting stalagmite-cemented gravel deposits are preserved in a number of places along this streamway. These have been dated using U-series dating techniques in two locations, just before the low section and at the junction with the Oxbow. At the junction with Fossil Passage, a stalagmite flow has been eroded to create a stalagmite bridge.

7. The Oxbows. This is an interesting example of a high-level, now abandoned phreatic passage, marking the former water-table position. Its importance is mainly for its passage geomorphology, but it also contains some interesting sediment and stalagmite deposits.

Manor Farm Swallet (ST 498556)

Manor Farm Swallet, is a single vadose streamway with various inlets, some abandoned, that descends to a phreatic tube in Nhasa Gallery before terminating in an extensive boulder choke. This cave, like the other Charterhouse swallet caves has been thoroughly studied and some dating work has been undertaken, notably in Fleet Street. In much of the cave an initial phreatic dip tube network can be seen. This was entrenched under vadose conditions as the phreas fell to a stable level at 120 m AOD, as shown by the classic vadose trench graded to the floor of Nhasa Gallery. Two phases of vadose erosion followed by clastic sedimentation and speleothem deposition occurred, as the water-table dropped to 92 m and below 81 m.

Extensive speleothem deposits occur in places, but the cave does not exhibit the extensive clastic fill deposits seen in GB Cavern, though some sediment banks occur in places, notably around Albert's Eye. The streamway is a biologist's delight as the water drains much of the farmyard above. Problems with pollution have occurred here in the past, in particular in Fleet Street. The cave has its own natural access restrictions, especially the

sediment banks in Fleet Street. Most of the features identified are robust, in particular the stalagmite-cemented sediment banks.

Manor Farm Swallet – sites on the survey

1. Entrance area. The entrance is a blasted shaft but it intersects the base of a natural shaft that was opened up during the 1968 floods. Historical photos exist of this feature, but it was back-filled by the farmer shortly after, with rubble and old cars.

2. Curtain Chamber is a clear example of a chamber formed at the junction of two vadose inlets. The chamber is named after the fine calcite curtain high in the roof. The upstream passages are fine examples of vadose inlet passages. One of the inlet streams can be followed under a floor of flowstone-cemented boulders.

3. This area contains impressive large stalagmite gours (Albert's Eye), with some fine flowstone formations deposited on a re-eroded fill of chert, limestone and shale debris. Natural erosion of this fill has created a series of false floors near the Junction with Fleet Street. Below the junction is a fine sinuous curtain and a large stalagmite boss (the Beehive) developed on a trenched fill.

4. Fleet Street. This early abandoned inlet to the main streamway contains some interesting sediment sections with scalloped flowstone deposits in the climb above Boulder Fall Hall. The sediments have been dated using palaeomagnetic methods.

5. Nhasa Gallery. The lower end of this impressive passage displays classic phreatic features, which are obscured by breakdown and flowstone at its upper end. The streamway which enters half way along is a text-book example of a vadose trench graduated to a phreatic tube. The rifts at the end of the passage display paragenetic and phreatic features.

Gough's Cave, Long Hole and Great Oones Hole, Cheddar

Gough's Cave is part of a network of caves including Saye's Hole, Gough's Old Cave, Long Hole and Great Oones Hole, all of which once functioned as, or are associated with, former resurgences. Farther down the Gorge, Cox's Cave is probably a truncated fragment of the Gough's conduit. Higher up the Gorge are a series of abandoned caves that have been intersected and truncated by incision of the Gorge. These include Sun Hole, Reservoir Hole, White Spot Cave, Whitebeam Slitter Cave and Bone Hole. However, most of these are either small archaeological sites or do not contain any significant features.

The modern resurgence for the River Yeo is at the foot of Cheddar Gorge (23 m OD) where the water emerges from the base of a cliff. The river is again met in both Saye's Hole, a short

phreatic cave containing a lake and Gough's Cave, where it can be followed upstream through two deep phreatic loops. Gough's Cave is a higher former resurgence and part of a complex system of abandoned and active caves, including Long Hole and Great Oones Hole, ranging in altitude from -28 m to 105 m OD, with a total passage length of over 2300 m.

At least four former water-table levels can be recognised, the elevations of which are graded to earlier gorge floor levels. The highest of these is the Great Oones/Long Hole system, formed when the water-table was at or above 105-110 m. Water once flowed up a phreatic riser at the innermost point of Great Oones Hole and continued horizontally along strike before flowing down dip into another phreatic loop in Long Hole, which is a truncated segment of the Great Oones conduit. The second is at or above an elevation of 70-75 m OD represented by Sand, Mushroom and Diamond chambers in Gough's Cave and probably fed by inlets from the north, such as Damocles Rift. The third is the main Gough's Cave conduit at 45 m OD, fed by a choked phreatic riser in Boulder Chamber and developed along the axis of a minor anticline. Evidence from two generations of superimposed scallops in the main Gough's conduit (The Fonts - Swiss Village segment) suggests it functioned during both the 70-75 m and the 45 m phases. The lowest level is the present active system at c. 23 m, forming the river passage, although in flood, the water rises over 6 m and flows out of the cave entrance. Classic structural guidance is demonstrated in the modern river passage. The water enters the system via a boulder choke in Sump 3 and flows through two deep phreatic loops (maximum depth 58 m) down dip, before flowing horizontally along strike to the resurgence. The resurgence itself occurs where incision of Cheddar Gorge has intersected the roof of the conduit.

Gough's Cave is a show cave which suffered considerable damage during its development in the 1880s. However, most of the remaining features are well conserved, although algal growth due to lighting is a potential problem that needs to be addressed by the cave management. Great Oones Hole and Long Hole are infrequently visited, and do not contain features liable to damage by normal caver traffic.

Gough's Cave – sites on the survey

1. Entrance Area. This area has extensive archaeological deposits, that have been excavated intermittently since the 1880s. The site is one of Europe's most important Late Upper Palaeolithic sites, and several human skeletons, including that of Cheddar Man, have been found here. Most sediment deposits have either been excavated or are preserved in alcoves or beneath the thick concrete floor. The passage itself is a fine phreatic tube with some notable joint-guided avens in the roof.

2. The Fonts. This is a fine series of stalagmite gour pools that is at risk from algal growth due to spotlights. At the top is a series of phreatic rifts aligned along the joints.

3. Heartbreak Hill. This is a superb phreatic tube with unusual two-phase scalloping in the roof.

4. Ring of Bells. The stalagmites in the pool here are probably not *in situ* but the 'display' here and at the 'Swiss Village' may preserve original sediments largely removed elsewhere during the development of the show-cave. Some noteworthy stalactites occur in the roof here. To the left of the stairs is a stalagmite on boulders that has been dated using U-series techniques.

5. The part of the cave displays superb structural guidance as it is developed along the axis of an anticline. In the new blasted tunnel leading to St Paul's, a narrow neptunean dyke infilled with Triassic red marl, clay and sandstone can be seen.

6. St Paul's. This large phreatic chamber contains some impressive stalagmite flows, although algal growth may be a problem. Behind, in the 'Aladdin's Grotto', some stalagmites are not in situ and artificial pools have been constructed.

7. Diamond Chamber. This large phreatic chamber contains some of the best stalagmite deposits in the cave (including the 'Frozen River' and 'Niagara Falls in Winter'), although those forming the main part of the 'display' have commonly been moved or used as light fittings. However, *in situ* speleothem deposits in the annexe, and in the Frozen River have been dated using U-series techniques. The eastern passage has some noteworthy sand deposits.

8. Boulder Chamber. Most notable for the well displayed fold observable on the wall, this chamber has some extensive breakdown deposits, but no notable stalagmite deposits. A shaft in the floor did not reach bedrock. Sediments in the passage leading to Far Rift were dated using palaeomagnetic techniques.

9. Damocles Rift. The start of this rift contains some interesting stalagmite false floors, that have been dated using U-series techniques. Nearby, sandy fluvial sediments on the floor were dated using palaeomagnetic techniques. Beyond, the rift degenerates into a major boulder choke, in which an enigmatic straight tusked elephant rib bone was found by cavers digging the choke, suggesting a more direct link to the surface.

10. Makin' progress. In one corner of this chamber is an alcove with some fine cross-bedded sandy fluvial sediments. A shaft in the floor drops into the river passage and the rest of the cave, which is accessible to divers. This part of the cave has not been examined by a

geologist, although some noteworthy laminated mud banks have been reported in at least one of the upstream sumps.

11. Stairwell. The left-hand wall going down the stairs is a sequence of sandy silts with thin interbedded stalagmite deposits, which proved too muddy to date. This sequence is capped by more extensive stalagmites, which the tourists see. Most of the sediment was removed to make the show-cave in the 1880s.

Great Oones Hole

12 This cave is the truncated upstream end of Long Hole. The entrance passage is a fine strike-orientated phreatic tube. Archaeological deposits occur just inside the entrance arch. At the inner end is a fine example of the rising limb of an abandoned phreatic loop (The Slip). The base of the loop is choked with sediment and stalagmite, which has been dated. A second sample has been obtained from the entrance passage and dated using U-series and ESR techniques. Some fine calcite geodes occur at the top of The Slip.

Long Hole

13. Long Hole is also a phreatic tube, although it contains little in the way of sediment or stalagmite deposits. Archaeological deposits (previously disturbed in the early part of the 20th century) occur near the entrance.

Grebe Swallet

Grebe Swallet is an abandoned 18th Century lead mine, which has intersected a series of natural rifts. The cave-cum-mine is of importance not only for its geomorphological interest, but also for the superb examples of neptunean dykes, lead mineralisation and mining archaeology. This cave, more than any other on Mendip, demonstrates the relationship between neptunean dykes, mineralisation, cave development and mining activity. It has provided important insights into lead mineralisation on Mendip and contains some unique mining artefacts. The entrance is located in the floor of Velvet Bottom and was discovered after the 1968 floods. The cave has strict access controls, including a leader scheme, and stringent conservation measures, including walling and taping. These have been implemented by the original discoverers to conserve the cave. Although many of the features identified are fragile, the conservation measures in place have so far protected them from damage.

Grebe Swallet - Sites on the survey

1. The sediment deposits in the entrance area were mainly derived from the 1968 flood debris, which caused the collapse of the entrance. Roman and modern artefacts were found here when the cave was first entered.

2. The Galena Ruckles. This extensive boulder collapse contains fine specimens of galena. It is a rare example of an undisturbed ore-bearing boulder choke, developed along a Triassic neptunean dyke. Undisturbed areas of this choke are protected by stone walling, leaving the deposits available for study.

3. Lode Chamber. This represented the original miners' way in. The far end has a superb example of galena-rich breccia incorporating Devonian, Carboniferous, Triassic and Jurassic material. Triassic and Jurassic neptunean dykes occur both in this area and the Galena Ruckles above. Specimens of Liassic fossils have been collected and identified from here. This loose choke has been stabilised and partially walled to protect it from collapse, yet still leaving it open for inspection.

4. Sidcot Chamber. This region contains some fine 18th Century mining artefacts, including a pair of miners' boots and a work bench with slabs of Pennant sandstone for sharpening tools.

5. Young Clarke's Passage. Between Sidcot Chamber and Young Clarke's passage are some remarkable miners inscriptions in the mud, dating to 1753 and 1755. These are protected by an artificial viewing screen. Some impressive mud-cracks that occur in the muddy floor in this area are taped off.

6. Semicostatum Rift. This boulder choke is developed along the line of a neptunean dyke which has yielded fossils of Jurassic age (*Semicostatum* zone) and boulders of Jurassic limestone up to 0.5 m in diameter. Again, dry stone walling has been used to protect the best features in this part of the cave.

Reservoir Hole (ST 4746 5447)

This cave, located in Cheddar Gorge, is important primarily for its superb passage geomorphology and represents an intermediate system between the swallet caves around Charterhouse and the resurgence at Cheddar. Access is strictly controlled under a leader system and, although a survey exists, it remains unpublished. However, the important sites in the cave are listed below.

1. Moonmilk Chamber. Some fine stalagmite deposits occur in this chamber, which is developed along a fault.

2. Grand Gallery. This is a superb elliptical phreatic tube, with an impressive group of stalagmites half way along, together with some interesting mud formations. At the upper end a narrow neptunean dyke can be seen.

3. Great Aven. This is the best example of a fault-guided phreatic rift on Mendip. At the top of the rift are the impressive Balch stalagmites. At the end is a choke with some potentially interesting sediments.

Lamb Leer SSSI

Lamb Leer Cavern

Lamb Leer Cavern is very unusual in that it is an isolated fragment of a phreatic cave system removed from the swallet or resurgence locations where most major known Mendip caves occur. Entered by miners in the 17th Century, the cave has long attracted interest and contains one of the largest chambers on Mendip. Although its origin is unclear, it may date from when the Mesozoic cover was more extensive. Although there are relatively few clastic and stalagmite deposits, these include rare stratified aragonite flowstone and a large stalagmite boss. No dating has been carried out in the cave, but the large phreatic chamber and its isolated position suggest great antiquity and may provide key evidence for the early Pleistocene development of this part of Mendip and the anatomy of the middle portion of the Mendip karst drainage systems.

The cave is also the location for many early historic cave photographs and a pioneering cave film produced by the Axbridge Caving Group. The surface was the site for early geophysical investigations during the 1930's. However, although the geology of the area has been studied, there has been little work on the speleogenesis of the system or any dating work carried out on the cave deposits. Consequently, little is known about the cave sediments.

Lamb Leer Cavern – Sites on the survey

1. Entrance area. The entrance is a mined shaft that intersects an old phreatic passage. Several other blocked shafts occur in the area and miners have dug several adits in the vicinity.

2. The Beehive. This chamber contains a spectacular large stalagmite boss, known as the Beehive. It is featured in many old photographs, but has not been the subject of any dating studies.

3. This passage contains a spectacular 25 cm-thick aragonite floor, left as a bridge across the passages as the sediment underneath was excavated. It is featured in many old photographs, but has not yet been the subject of dating studies.

4. Great Chamber. This is one of the largest chambers on Mendip and well decorated with flowstone in places. It has a predominantly phreatic form and the floor is composed of breakdown. Miners have modified the chamber floor in places.

5. Cave of the Falling Waters. The chamber, developed along a fault line, has some fine flowstone on the right-hand wall. An inscription on the wall reads 'T.W. 1894', carved by Thomas Willcox.

6. Stal Avenue. As the name suggests, this well-decorated chamber contains copious amounts of stalagmite.

7. St Valentines Series. This series of high-level abandoned phreatic passage in places contains much sand and clay on the floor, and scattered gour pools. No attempt has been made to date these deposits.

8. December Chamber. This chamber contains noteworthy (but un-quantified) floor deposits.

Crook Peak – Shute Shelve Hill SSSI

Shute Shelve Cavern

Shute Shelve Cavern (ST 424554), 1 km north-east of Axbridge is the dip-oriented section of a single large abandoned phreatic loop, greater than 56 m deep. This system once carried water from former swallets to the north to a resurgence in the vicinity of Axbridge. There are several other cave fragments in the area. The cave is developed essentially along a single bedding plane and consists of a large abandoned phreatic passage up to 30 m wide. The cave is unusual because of the large size of the main passage, one of the largest phreatic passages on Mendip, and because of its antiquity. This system probably functioned when Triassic and Early Jurassic rocks infilled the Lox Yeo valley, forming a topographically higher catchment area allowing allogenic recharge into the limestone. The first chamber was entered by ochre miners, who left some artefacts behind, but the rest of the cave was unknown. It may be the 'Lost Cave of Axbridge'. Of additional interest are the haematite deposits in the Box Tunnel area.

Shute Shelve Cavern – sites on the survey

1. Reynards Chamber. The entrance is excavated through an ochreous fill. The best stalagmite formations in the cave occur in this chamber and have been dated using U-series techniques. Much of this chamber is floored by breakdown.

2. This part of Reynards Chamber is where ochre miners entered the cave. Various pit props and other mining relics were found here, together with the skeleton of a cat, probably recent.

3. Box Tunnel. At the base of the climb down into the Box Tunnel, numerous fragments of haematite, limonite and ochre can be found. These have weathered from veins in the walls and roof and form outstanding 'box-work' in places. On the right is a small alcove with what appears to be stratified deposits. These proved unsuitable for palaeomagnetic dating, but are the only stratified sediments in the cave.

4. At the base of Box Tunnel there are some text-book examples of surge marks developed on muddy sediment in alcoves at roof level.

Priddy Caves SSSI

Swildons Hole

At 9.1 km in length, Swildons Hole is the longest and one of the most frequently visited caves on Mendip and is a classic influent cave system. Water draining the Old Red Sandstone of North Hill sinks in a blind valley on reaching the Black Rock Limestone. First descended in 1901 it is one of the earliest systematically explored caves in Britain. From the entrance a fine vadose streamway descends steeply to the west, until it reaches Sump 1, almost under Priddy church. From here the passage gradient slackens and the streamway turns along the strike, creating a series of phreatic loops through eleven more sumps. Between the sumps the stream flows through vadose canyons entrenched into the loop crests. Above the streamway lies a network of phreatic passages and vadose inlets, now abandoned by the stream, forming a complex series of interconnected passages. At least three main phases of cave development have been identified. The cave is an outstanding example of a 'State Three' cave system, and together with other Mendip caves, stimulated development of the "four-state model" for cave long section genesis. In addition, it aided the modern understanding of the network linking rules that govern the plan patterns of a majority of caves forming where there is unconfined groundwater circulation. However, relatively little work has been undertaken on dating the system or comprehensively studying the cave sediments. Thus, most deposits remain uncharted, in particular those beyond Sump 4 and in parts of the cave discovered since the 1960s. For a comprehensive inventory of scientifically important features, a survey carried out with this in mind is needed.

The cave has been open to visitors for over 100 years. Although a very popular cave, most trips are concentrated in the Swildons 1 & 2 streamway passages and some of the fossil high-level passage. Much of the cave, especially beyond Shatter Passage and Sump 4 is rarely visited. In Swildons 1, most of the flowstone deposits and sediment deposits are at roof level or are massive robust flowstone bosses, or in obscure parts of the passages.

Swildon's Hole – sites on the survey

1. Long Dry Way. This is a classic abandoned vadose inlet passage now occupied by a series of underfit streams. Extensive flowstone deposits occur in places, notably near entrance and in the Boulder Chambers, where some have been dated using U-series methods. The most extensive flowstone deposits occur in the Old Grotto, which has an extensive false floor undermined by the stream. These deposits are comparable to those seen in GB Cavern. Soot marks, dating from early exploration of the cave in the early 20th Century mar parts of the chamber. Some aesthetic damage to the flowstone has occurred in this part of the cave.

2. Water Chamber. The rift below the water chamber was formerly choked but was reopened during the 1968 floods in one of the more spectacular demonstrations of the power of flood water. Just below the 'Old Forty' is a superb example of folding.

3. Swildons One streamway. This classic streamway is one of the best examples of a vadose streamway on Mendip. The passage between the Water Chamber and Sump 1 admirably displays many characteristic features of a vadose streamway, including cascades, potholes and vadose trenches. In places it is decorated profusely with flowstone and stalactite formations. In particular, Barnes Loop has spectacular flowstone formations. This oxbow also has noteworthy gour pools with cave life (shrimps). These have thrived despite the cave being open for over 100 years. Some stalagmite deposits have been dated using U-series methods. There is comparatively little stream laid fill.

4. Tratman's Temple. This high-level chamber is well decorated with impressive flowstone deposits, although some were damaged shortly after the cave was opened. It forms the start of the high-level abandoned series of phreatic passages. Beyond, St Paul's and Paradise Regained also have fine stalagmite deposits.

5. Swildons 2. Streamway. This section of passage has some classic shallow phreatic loops, the downward portions of which are infilled with stream sediment (Creep 1 and 2). The crests of these loops are incised by fine vadose trenches. Like the Swildons 1 streamway, the passage is well decorated in places.

6. Swildons IV streamway. This passage is a classic, well sculpted vadose trench incised into the floor of a phreatic loop crest. There are some notable fluvial stream sediments in places. Blue Pencil Passage connects the high-level abandoned phreatic network with the modern streamway and is a classic example of a vadose drawdown capture.

7. Beyond Sump 4. This area has not been studied as it is inaccessible to most cavers. However, it is reported that there are some fine sections of phreatic passage in places.

8. Black Hole Series. This is a classic example of an abandoned vadose inlet passage with some fine formations near Sore Knees Creep.

9. Howard's Dig. This section of passage has some well developed flowstone formations near the 10 Foot Overhang. This area is of especial interest in unravelling the geomorphological history of the cave, as there is a complex sequence of passage captures and drawdown here.

10. Vicarage Passage. This area is the upstream portion of the Double Trouble high-level abandoned phreatic conduit.

11. Shatter Pot area. This area is a classic part of the cave for studying the geomorphology of abandoned phreatic looping passages. Many descending tubes are interrupted by short lifting tubes along joints, creating classic phreatic looping profiles. In Shatter Passage, late-stage ponding between here, Fault Chamber and the second Mud Sump led to the creation of sediment fills and paragenetic notches, notably around Wright's Dig. Much of this part of the cave is developed near the Priddy Fault. Some fine sediment deposits occur in the Fault Chamber area.

12. Sidcot U tube. This is a fine example of an abandoned phreatic loop, which ponds up in winter. Coarse sandstone cobbles occur here, indicating a route in from the surface. Some of the sediments in this area were sampled for palaeomagnetic dating but proved undatable.

13. Double Trouble Series. Again, a classic part of the cave for studying the geomorphology of abandoned phreatic looping passages. There are few clastic deposits in this part of the cave, but some flowstone deposits occur in places.

Eastwater Swallet.

Eastwater Cavern provides a text-book example of a stream sink and blind valley developed at the boundary between the Black Rock Limestone and the Lower Limestone Shale, an interesting exposure of which can be seen at the cave entrance. The entrance is a 25 m-deep boulder choke. Below, the cave extends for over two kilometres; much of which is a complex series of bedding plane passages, rifts and fault-guided shafts, including the 55 m-deep Primrose Pot. The stream has been traced to Wookey Hole with a travel time of about 16 hours. However, little serious research has been undertaken in the cave, especially in the recently discovered West End Series (see Mendip Underground for a description), and hence the location of scientifically interesting stalagmite and sediment deposits remains unknown. High quality 'aesthetic' stalagmites are known to occur in places in the West End Series. Most of the interesting features in the cave are passage geomorphology and, for this reason, a survey of this cave is not included in this report. It is already documented in the GCR volume (Waltham et al., 1997).

Priddy Pools SSSI

St Cuthbert's Swallet.

St. Cuthbert's Swallet is the second longest cave on Mendip at nearly seven kilometres, and certainly the most complex. It lies, as with most swallet caves, at the contact between the Black Rock Limestone and the Lower Limestone Shales and has developed along both sides of a plunging anticline, which has been cut by several thrust faults. Below the cave entrance, several vadose streamways enter a complex multi-level series of well-decorated collapse chambers and passages, before the streams amalgamate and flow into a long joint-guided rift to enter a sump 140 m lower. The water has been dye traced to Wookey Hole with a travel time of about eight hours, confirming a trace carried out in 1860. This latter trace provided the basis for a successful lawsuit in 1863, by the owners of Wookey Hole Paper Mill against the St. Cuthbert's Leadworks for polluting the stream.

The cave geomorphology was studied in the 1960s, but relatively little work has been undertaken since. Much of the cave has been infilled with coarse clastic sediment in the past, and this has led to the development of extensive paragenetic passages. Fragments of this infill can be seen in many places. Subsequent collapse of much of the system has created an extensive highly complex network of breakdown chambers. The complexity of the system makes site assessment difficult. Little dating work has been carried out in the system, except near the entrance series.

Access is controlled by the Bristol Exploration Club, who operate a leader and key system, and have produced a comprehensive report on the system (Irwin, 1991). The club also takes responsibility for the conservation of the cave.

St Cuthberts Swallet - Sites on the survey

(NB Due to its complexity, St Cuthberts Swallet is shown on three sheets; Sheet 1; the Main Chambers, Sheet 2: St Cuthberts 2; Sheet 3: The Rocky Boulder Series).

1. Wire Rift. In the roof of this passage is a series of stalagmite-cemented false floors, that have been dated using U-series dating methods.

2. At the far end of Mud Hall, by the climb to Pillar Chamber, there is a sequence of stalagmite flowstone and sediments, some of that have been dated using U-series methods. Pillar Chamber itself contains a large stalagmite pillar and large masses of botryoidal stalagmite. In Pillar Chamber Extension, the rift at the far end of this passage contains a well developed flowstone deposit.

3. Gour Passage. This passage marks the highest point in the cave in which phreatic features are found, and is a classic example of a vadose-phreatic transition. This large phreatic passage is choked with flowstone, from which the passage takes its name.

4. Coral Chamber. This cave has some well exposed coral fossils, and the far end of the chamber is covered with a large expanse of stalagmite flowstone. The neighbouring Marble Hall has a superb exposure of a fault zone with well-exposed breccia. There are prominant displays of fossils on the walls. The walls of Marble Pot are covered with stalagmited pebbles.

5. Rocky Boulder Passage. A mammoth's tooth was found here in 1956. No other remains have been recorded. In the Rocky Boulder Central route is an impressive stalagmite cascade. Near the connection to the Old Route are some interesting sword-shaped calcite crystals.

6. Boulder Chamber. Close to the connection with Curtain Chamber are some superb stalactites with well developed drip pockets preserved on the underside of a suspended stalagmite false floor. Beyond, in Curtain Chamber, are some outstanding stalactite curtains, together with cave pearl nests.

7. Upper Traverse Chamber. Above here, in Maypole Alpha is a nest of cave pearls and stalagmite gours. Nearby, in High Chamber, there are some notable helictites, cave pearls and stalagmite columns.

8. Railway Tunnel. At the top end of the Tunnel is one of the best stalagmite cascades in Britain, descending over 30 m from a high rift. Lower down, this superb phreatic tube is partially blocked with spectacular cobble and gravel deposits, providing one of the finest examples of sediment deposition in the cave.

9. Rabbit Warren. This is a superb network of anastomosing phreatic tubes modified by paragenesis, with excellent rock pendants developed on the western limb of an anticline. In places, there are classic examples of stalagmite-cemented pebble infills (notably around Passage D), stalagmite flows (1st and 2nd Stalagmite banks), pools with calcite 'soapflakes' and mud formations at one point. The most notable feature is the thickness of the stalagmite flows.

10. Main Stream Passage. At this point, the stream flows entirely on sediment deposits, in a classic phreatic passage with superb paragenetic pendants. In places, notably Stalagmite Pitch, large masses of stalagmite flowstone occurs.

11. Struggle Passage. This passage contains one of the largest helictites in the cave.

12. Beehive Chamber and Gour Hall. This part of the streamway contains some of the largest stalagmite deposits in any Mendip cave. The Great Gour is thought to be the largest in the country. The rift beyond is a straight fault-guided passage.

13. The Dining Room. At the start of the Cerberus Series is a superb exposure of a very coarse sandstone cobble conglomerate cemented in a stalagmite false floor. The Dining Room contains interesting stalagmite false floors and sediment deposits, notably at the climb up to Cerberus Hall from the Dining Room. This series of passages is developed on the line of the Gour-Lake Fault.

14. Cairn Chamber area. In the passage near Cairn Chamber is a delicate array of small stalactite 'fern leaves' which were once thought to be gypsum. Beyond is Helictite Chamber where there is a 1 m-thick stalagmite false floor with excellent coarse gravel deposits and a crystal pool with calcite rafts. Cairn Chamber itself is a well developed phreatic tube with a superb group of gour pools.

15. Continuation Chamber. An interesting stratigraphic section is exposed in the climb down into Continuation Chamber.

16. September Series: There are relatively few sediment deposits in this part of the cave,which is dominated by breakdown chambers. Cone Chamber has a fine conical stalagmite boss in the centre of the chamber and impressive flowstone banks. September Chamber is one of the largest in the cave, and has some superb stalagmite formations, with columns, curtains, helictites and flowstone banks. Victory Passage again has an impressive display of stalagmites, stalactites, crystal pools and gours.

17. Long Chamber Series. This section of the cave is a complex series of ascending unstable breakdown chambers developed on the bedding, and provides a fine example of bedding plane collapse. In places there are spectacular stalagmite deposits, notably in Long Chamber, Pearl Chamber, Chandelier Passage, Bell Chamber and, in particular, Straw Chamber.

18. Canyon Series. Again, this series of breakdown chambers contains some exquisite calcite formations, notable in Forbidden Chamber. The Canyon itself is a superb example of a vadose canyon developed beneath a phreatically enlarged bedding plane.

19. St Cuthberts II. Shortly beyond Sump I is a large gravel sediment bank. There are few stalagmite formations in this part of the cave except at the stalagmite barrier.

Wookey Hole SSSI

Wookey Hole

Wookey Hole is one of three show caves on Mendip, the other two being at Cheddar, and is the second largest resurgence. It provides an easily accessible example of a resurgence cave. The cave is unusual in that much of it is developed in Triassic Dolomitic Conglomerate. The horizontal bedding and prominent vertical jointing produce a markedly different style of cave to that formed in dipping Carboniferous Limestone. The subterranean River Axe can be followed upstream by divers through a series of sumps to the current limit of exploration at Wookey 25. The river drains much of central Mendip, including most of the caves in the Priddy area.

Exposures of the Dolomitic Conglomerate are well exhibited in the entrance passage, an abandoned resurgence of the River Axe. Descending 'Hell's Ladder' enables the visitor to see the present underground River Axe. The 'Witch of Wookey' is a well known example of a stalagmite boss, although unfortunately previous visitors have removed many of the formations in the cave. Archaeologists found evidence of a Romano-British cemetery in Chamber Four. Beyond, the show cave (partly mined) enters a splendid series of rift chambers developed along prominent joints, to enter Chamber Nine. A leak in the floor of this chamber has been dye-traced to Glencott Spring, one kilometre to the south. Chamber Nine is the limit for non-cavers, but a climb in the far corner enables experienced cavers to enter a well-decorated high-level passage, which can be followed almost to the surface. This passage acted as a former resurgence for the ancestral River Axe.

A short distance upstream the cave emerges from the Carboniferous Limestone, and the passage form changes to a series of deep phreatic loops. The deepest point yet reached in Wookey 25 (and in Britain) is some 60 m below the water surface. The mined route out to the surface from the show cave section provides a superb exposure of the Dolomitic Conglomerate.

The entrance section has been known for centuries and has consequently suffered much damage. The inner reaches are accessible only by diving, so little is known about the passage geomorphology and deposits.

Wookey Hole - Sites on the survey

1. Entrance Series. This part of the cave is open to the public as a show-cave. Many of the stalactite formations were removed during the 18th and 19th centuries. Those that are left include the Witch of Wookey, a large stalagmite boss. There are some interesting sediments at the entrance to the grottos on the western side of the First Chamber.

2. Chamber 4. This is the site of a Romano-British cemetery, which has been excavated archaeologically.

3. Chamber 9. Above Chamber 9 is a series of high-level passages. These contain some interesting stalagmite deposits that have been dated using U-series methods. The mined passage back to the surface has some well-exposed sections through the Triassic 'Dolomitic Conglomerate

4. Wookey 20. At the top of this passage are some interesting stalagmite deposits, and the cave re-enters the Dolomitic Conglomerate.

5. Wookey 25. This is a superb and very deep phreatic loop, the end of which remains unexplored.

The other caves in the ravine (Hyaena Den, Rhino Hole, Badger Hole) are all important archaeological sites.

Stoke Lane Slocker

Further up the valley, Stoke Lane Slocker is the sink for Mendip's largest swallet stream and the longest cave on East Mendip. Beyond the entrance lies 2.2 km of passage, much of which is a gently graded streamway punctuated by eight sumps. The stream contributes some 75% of the water resurging at St. Dunstan's Well. Above the streamway are several very well decorated chambers, and a chamber containing archaeological deposits including human bones. The poorly incised nature of the stream sink may suggest a relatively recent origin for the swallet cave, although the high-level chambers are probably much older. The original sink may have been further upstream, closer to the Black Rock Limestone – Lower Limestone Shale boundary in Stoke St. Michael. Nearly all the features of interest occur in the high-level abandoned chambers beyond the sump. The rest of the streamway, although interesting for its overall geomorphology, has little of interest. No dating work has been carried out.

Stoke Lane Slocker - Sites on the Survey

1. Entrance area. The entrance to this cave is probably not the original stream sink as the passage is very immature. The streamway between here and Sump 1 contains some notable fluvial sediments in the stream which flows along a complex grid of joint aligned phreatic passages. Some flowstone in Browne's Passage shows evidence of re-solution.

2. Above the streamway, several high-level abandoned phreatic chambers contain extensive exceptional flowstone formations, some of which are very large. These include the 'King' and 'Queen Victoria' in the Throne Room. None of the formations in these high-level chambers have been dated.

3. Bone Chamber. This chamber has no flowstone, but does have deposits including human and animal bones intermixed with charcoal and ash, probably of no great antiquity. This indicates that the cave was once open to the surface near this point.

4. Streamway. This streamway is of interest for the geological control on passage development, both down-dip and along strike. There are some interesting fluvial sediments in places, notably around Sump 3 which appears to act as a filter for coarse sediment.

Fairy Cave Quarry Caves

Although now disused, Fairy Cave Quarry is a superb example of where not to quarry. Situated almost directly behind a major spring, the quarry intersected over 25 caves including fragments of two major conduits, both draining to St Dunstan's Well. Over 4.5 km of passage have been recorded, but some 800 m have been quarried away. The western branch (Withyhill, Hillwithy and Hillier's caves) is largely abandoned by its stream and, if it had not

been intersected by quarrying, almost extended the whole distance from the sink at Withybrook Slocker to the resurgence at St. Dunstan's Well. The eastern side (Balch, Fairy & Shatter caves) is developed predominantly along the Withybrook Fault. Many of the caves contain profuse stalagmite formations, including some of the best formations in Britain. None of the formations in the cave have been dated. The passages represent the only cave system on Mendip that can be explored in almost its entirety from sink to rising.

Fairy Cave Quarry Caves - Sites on the Survey.

Fairy Cave

This cave has been known and open for hundreds of years, but quarrying has produced considerable shattering, and tar has seeped in from the quarry boiler plant above. There are some noteworthy formations throughout the cave, although their aesthetic qualities have been diminished. Much of the cave is affected by breakdown, and there are no known significant sediment deposits, but the cave is worthy of note as part of the Fairy Quarry Cave system.

Hillwithy Cave

This is the downstream section of Withyhill Cave, truncated by quarrying. Although it contains little in the way of formations and sediment, it is worthy of note as part of the Fairy Quarry Cave system.

Hillier's Cave

Connected to both Fairy Cave and Hillwithy Cave, this cave is much affected by sludge ingress and tar seepage from the quarry workings. There are some interesting stalagmite formations in the Upper Grotto, the Cambridge Grotto and in the Red Room at the end of the cave. None have been dated.

Shatter Cave

Shatter Cave is one of the best decorated caves in Britain. It has a profusion of stalactite, stalagmite and heligmite formations, some interesting sediment deposits in Diesel Chamber, and superb passage geomorphology with phreatic tubes and vadose trenches. Nearly the whole cave contains abundant spectacular flowstone formations, the best of which are mentioned on the survey. None of these have been dated.

Withyhill Cave

Like Shatter Cave, this cave has a profusion of superb flowstone formations and some interesting passage geomorphology. Nearly the whole cave contains spectacular flowstone formations, the best of which are mentioned on the survey. None of these have been dated.

Banwell Caves SSSI

Banwell Bone Cave and Stalactite Cave

Both these caves occur on Western Mendip and are important chiefly for their bone deposits, but also as they may provide evidence for Triassic cave development. Both caves are isolated abandoned phreatic passages, no longer related to modern drainage patterns, and have been truncated by surface lowering. The Bone Cave is of especial interest, as it functioned as a pit-fall trap and has an unusually rich Pleistocene bone assemblage. Apart from archaeological excavation, little research has been carried out in the caves. The stalactite cave was once open as a show-cave. Access to both is controlled by the landowner.

Sites on the Survey - Banwell Bone Cave

1. The Bone Chamber. William Beard excavated much of this chamber, which was filled almost to the roof until about 1840. He stacked the less interesting bones around the chamber where they still remain. Although most of the deposit has been excavated, pockets of sediment still remain.

2. Baker's Extension. This is an interesting rift developed along the near vertical bedding. The sediment infill in this rift has been excavated and has yielded archaeological bone-bearing deposits. One of the few stalagmite formations in the cave occurs in this chamber.

Banwell Stalactite Cave

3. Main Chamber. This is an interesting example of cave development in near-vertical bedding. Of particular note is phreatic pocketing infilled with barytes. As the mineralisation on Mendip is though to be of Triassic age, this may suggest a Triassic age for the cave.

4. Great Chamber. At the far end of this chamber is a small grotto with a pool that contains exquisite calcite rafts.

Burrington Caves SSSI

Most of the Burrington caves are developed as stream sinks along the Black Rock Limestone – Lower Limestone Shale boundary contact, the water resurging along the northern flank of the Mendips, or as relict phreatic mazes. The steep dip here, up to 70°, has influenced the cave morphology in the area. Many of the caves descend steeply down dip to the water-table, and are thus commonly choked with washed-in material. As a consequence, the stream has often had to find alternative routes, facilitated by the numerous fractures, thus forming complex bouldery mazes. However, few caves have been studied systematically, or have any obvious significant deposits. Their interest is primarily in the superb passage morphology and structural guidance of cave development in steeply-dipping limestones. Thus, no cave surveys are produced, but the main sites are briefly described.

1. Aveline's Hole (ST 476586)
Discovered in 1797 by two men digging for rabbits, this gaping hole adjacent to the road was largely excavated by archaeologists, including Boyd Dawkins, who named the site after his friend, William Aveline. Several human skeletons and a rich Late Palaeolithic fauna were found. The cave is a fine example of a phreatic tube, and probably once acted as a resurgence.

2. Lionel's Hole (ST 479582)
The cave extends west along strike as an intricate close-knit three dimensional phreatic maze, at times directly below the road. It is a particularly well-developed example of a complex phreatic maze system developed in steeply-dipping limestone.

3. East Twin Swallet (ST 479581)
The East Twin stream disappears into a sink developed on the Black Rock Limestone – Lower Limestone Shale boundary. However, it cannot be followed far underground, although the water reappears in Pierre's Pot in the West Twin valley. Above the streamway is a series of small passages, which locally contain sediment deposits.

4. Read's Cavern (ST 468584)
Originally called Celtic Cavern, after the Early Iron Age occupants found buried by a rock fall outside the entrance, this cave consists of a large chamber, with several unstable routes below. Some archaeological deposits were found in the main chamber.

5. Bos Swallet, Rods Pot, Drunkards Hole and Bath Swallet (ST 472584)
Adjacent to the track lies a series of deep dolines, four of which contain small, genetically related, caves. All the penetrable caves descend steeply down dip, before ending in chokes. The first and highest is Bos Swallet. The entrance depression here was excavated archaeologically yielding many artefacts including Beaker age pottery and Neolithic

implements. The second is Rod's Pot, Drunkards Hole is the next, and finally the active stream sink at Bath Swallet. Each of these small caves admirably demonstrates cave development in steeply dipping limestone and the structural and water-table guidance of passage genesis. Some sandstone-rich gravel deposits occur in Drunkards Hole, and Rods Pot has some stalagmite deposits in the Main Chamber, but these are secondary to the cave's geomorphological interest.

6. Goatchurch Cavern (ST 476582)

Once operating as a show-cave, Goatchurch is now one of Mendip's most accessible novice caves. Two entrances lead into a complex 3D bouldery phreatic maze, descending steeply with the 60° dip to a depth of c. 60 m. It is the largest cave in Burrington, and contains extensive stalagmite deposits in the upper entrance passage, some of which were partially removed (revealing internal growth structures) when the cave was a show-cave. As with most caves, odd patches of sediment are preserved in places, but there are few stalagmite deposits of aesthetic value.

7. Pierre's Pot (ST 476584)

Adjacent to the track, in trees, is the rift entrance to Pierre's Pot. This cave has not been investigated scientifically, but interesting deposits may occur in the recently discovered streamway (survey yet to be published). The upper part of the cave is a classic example of cave development in steeply-dipping limestone.

Thrupe Lane Swallet SSSI

Thrupe Lane Swallet is a classic example of a shaft-dominated vadose swallet cave system. It has an extensive series of joint and fault-guided shafts, including one of the deepest shafts on Mendip. It has much in common with the vadose shaft systems in Yorkshire. Most of the geomorphology has been described in Waltham et al., 1997. The system has not been studied systematically for its geomorphology, and significant stalagmite and sediment deposits are unknown for this reason. However, some deposits of interest may occur in the abandoned high-level Railway Series.

Upper Wye Valley SSSI

Background

Within the Wye Valley SSSI extensive outcrops of Lower Carboniferous (Dinantian) limestone and dolomitized limestone have long supported the development of underground drains. It has been suggested that the earliest conduit development took place actually at the end of Dinantian times, as long as 330 million years ago. This is supported by evidence of younger (Late Carboniferous) clastic sediment filling palaeokarstic voids in Dinantian rocks, the closest recorded occurrence being in the Doward/Seven Sisters area on the north bank of the Wye. There is also clear evidence that water-filled voids ramified across much of the Forest of Dean area, including the Upper Wye Valley area during the Triassic Period, when deposits of iron-ore were precipitated in the voids, probably during Carnian times (beginning some 227 million years ago). Subsequently the higher conduits were drained and some were enlarged and connected by the effects of meteoric water, possibly before, but certainly after the Proto-Wye began to incise its current gorge-like channel, probably during the late Palaeogene or early Neogene (30 million to 20 million years ago).

Most of the known underground drainage in the area including and south of Symonds Yat, lying east of the river and extending as far east as Edge End and as far south as Staunton emerges from a major resurgence on the east bank of the river at The Slaughter. Almost certainly this site marks the lowest topographical level where the modern Wye encounters the lowest stratigraphical guide of cave development within the main limestone sequence, in the core of the Worcester Syncline. Equally probably the river, in cutting down, has encountered an ancient underground drainage system, allowing water to emerge on the east bank of the river and, though unconfirmed, perhaps also in the river bed.

The two caves described below represent the currently most extensive and scientifically important system that is known to drain to the Slaughter Resurgence (Wet Sink or Slaughter Stream Cave) and one of the best examples of an abandoned high-level system, with iron-ore deposits, left perched above the river following its incision (Lady Park Wood Cave).

Wet Sink (Slaughter Stream Cave)

Slaughter Stream Cave was first entered, by way of an excavated shaft in the floor of Wet Sink, in 1991. The system is currently about 15km long, and includes equally impressive active and abandoned passages that display admirably the complex relationships between stratigraphical, structural and hydrological guidance of cave development. Furthermore, some elements of the cave may have developed around 220 million years ago, during mid to late Triassic times. In places, the upper abandoned passages contain superlative sediment deposits with well-developed ripple marks. Like many caves developed partly below an impermeable rock cover, the cave contains few stalagmite deposits, but those that do occur (such as the Flow Choke and the Snow Garden) are very spectacular.

The presence of bones, animal tracks and ancient man-made detritus indicates that other open surface connections existed in the past. Particularly intriguing is the dog skeleton preserved, together with the animal's footprints, in Dog's Grave Passage, far removed from any sinkhole or other possible entrance. How this animal came to be in the cave, and especially in this part of the cave, is a mystery. Equally intriguing is the question of the route followed by the water that passes through this and adjacent cave systems as the drainage passes beneath a major surface watershed on route to the major Slaughter Resurgence on the east bank of the River Wye, south of Symonds Yat. Finally, recent explorations, not yet fully documented, indicate that sporadic deposits of iron-ore may be present in high-level passages on the extremity of the known system.

Sites on the Survey – Wet Sink (Slaughter Stream Cave)

1. Entrance Series. This area is complex, and provides a fine example of vadose shaft development in dolomitized Lower Carboniferous limestone. Much of the rock is intricately fretted, due to the combined effects of the spattering of falling water and of water moving as films across the rock surface.

2. Streamway. The Entrance Series meets a major streamway at Cross Stream Junction. This stream is particularly rich in aquatic life, notably supporting albino trout. However, the stream is often polluted, due to the effects of overflow from a sewage works upstream of the entrance. Many animal bones have been found in the streamway, including those of *Hippopotamus,* dated as being at least 125,000 years old. The streamway itself is a well-developed vadose canyon that follows the dip of the limestone, with common side-steps along joint fractures. A series of shaft inlets augments the stream, and the passage exhibits well-marked scalloping and other classic examples of dissolutional morphology.

3. Dryslade "Series". The streamway ends at Sump 1, c.800m downstream of Cross Stream Junction. A by-pass to this first flooded section is provided by the Dryslade "Series", much of which comprises an unmodified dissolutional tube passage (Dryslade Passage), partly infilled by thick sandy sediment. Coal Seam Passage, which is a 400m-long ascending route to the Chunnel (qv), joins Dryslade Passage from the right. A climb on the left leads to Pirate Passage, at least 1800m long, which passes beneath the surface watershed to the east and probably once carried drainage from the area north of Edge End.

4. Sculpture Trail. Dryslade Passage rejoins the main streamway just downstream of Sump 2, where the passage is known as the Sculpture Trail in recognition of the rock being extremely heavily corroded by dissolution. Locally the Sculpture Trail is up to 15m high, with a classic T-shape, indicative of vadose incision into a pre-existing phreatic tube. This streamway ends

where the passage once more becomes water-filled at Sump 3, some 700m downstream of Sump 2.

5. Kuwait Passage. Dry sandy passages on the right of the streamway before Sump 3 exhibit a marked change of trend, turning sharply right into a 2m-wide rift passage that leads into the start of Kuwait Passage. Through much of its length Kuwait Passage retains a relatively narrow rift morphology, with walls of jet-black limestone or dolomitized limestone, against which many isolated pure white calcite formations are well-displayed. Some 1000m beyond Sump 3 Kuwait Passage gives way to smaller rifts and traverses and a small streamway, ending in a sump that marks the current limit of exploration in this direction.

6. Zuree Aven, the Graveyard and the Gravity Dig. Upstream from Cross Stream Junction at the foot of the Entrance Series is Zuree Aven, a 25m-high chamber, whence an upward climb gives access to the extensive largely abandoned areas of the Wet Sink system. The Graveyard is a large passage containing bone-bearing deposits. An extensive suite of bones found here and in the nearby Gravity Dig, includes bones from domesticated species, and possibly ancient human remains.

7. The Chunnel. Beyond the Graveyard large abandoned passages lead into a still bigger westward-trending passage known as the Chunnel, which is an impressive example of a formerly phreatic conduit, now modified by breakdown. A climb down through a choke on the left side of the Chunnel enters Coal Seam Passage (qv). Westwards the Chunnel meets a complex area of rift passages and chokes, one of which contained an *Auroch* bone, dated at 2000 to 3000 years old.

8. The Three Deserts. Bicknor Street Passage leads off from the right of the Chunnel and into the Chunnel Bypass, which in turn gives access to the Three Deserts. This section of the abandoned high-level phreatic conduit system contains three low areas with superbly preserved, largely undisturbed sediment banks (mainly sand and silt), which display pristine current ripples.

9. Dog's Grave Passage. About 360m beyond the western end of the Chunnel an upward climb leads to more rift passages. To the left a scalloped rift and associated ox-bow passage expose animal tracks in floor sediments, and some way farther along the main passage is the skeleton of a dog. This is one of the best examples of an animal skeleton in the deep part of a British cave system. How the dog entered the Wet Sink system at all is unclear; how it managed to reach these particular passages is currently a total mystery.

10. Helictite Rift, Tinkle Passage and the Snow Garden. Beyond the Dog's Grave, a series of rift passages, some with large crystal growths on the walls, and traverses leads through the

well-decorated Helictite Rift and Tinkle Passage to the Snow Garden. Here, a tunnel leads over white calcite flakes into a high but narrow streamway with a white calcite floor. Beyond the Snow Garden, passages belonging to the Re-Melt Series are currently incompletely explored, but the survey indicates that they are very close to the termination of Kuwait Passage (see above). Interestingly these topographically high passages may also contain material attributable to the Drybrook Sandstone (formerly regarded as absent in the Joyford area), and indications of iron-ore mineralization

11. Flow Choke Passage and the Flow Choke. Another route leads on from the Three Deserts passage, continuing the general trend of the Chunnel – Three Deserts high-level development. The main route through this rather complex area is Flow Choke Passage, a generally sizeable abandoned streamway (up to 10m high) that has been much modified by breakdown. The passage ends, some 800m beyond the Dog's Grave Passage – Flow Choke Passage bifurcation, at a large choke (the Flow Choke), which is notable for the anomalously large mass of flowstone presented by the stalagmite-covered blockage.

Lady Park Wood Cave

Around Symonds Yat, on the borders of Gloucestershire and Monmouthshire, the meandering River Wye has incised a deep and spectacular gorge. In cutting down the rejuvenated river truncated innumerable pre-existing cave systems within the Lower Carboniferous limestone and dolomitized limestone succession south of Symonds Yat. At least some of these truncated cave passages contained iron-ore minerals, probably emplaced in already ancient but still water-filled passages during the latter half of the Triassic Period (c.225 million years ago). Much later, early Man entered some of the mineralized caves, searching for and taking the readily-dug ore minerals and ochre. Ore-free cavities, or those with only traces of ore, were also entered, and where the ore was absent or mineralization failed, artificial tunnels were later cut through the rock in search of further deposits.

Topographically Lady Park Wood Cave is one of the highest of these mineralized caves, lying close above the top of the main cliff, on the south bank of the Wye, a few hundred metres downstream of the Biblins suspension bridge. Reputedly the site was operated as a "show cave" during Victorian times, and as recently as 20 years ago the remains of an iron gate were visible at the entrance. The surface of the more gently sloping ground above the cave entrance is pock-marked by shallow depressions, including Diggers Hole, at least some of which appear to be natural dolines. Others, however, were almost certainly created, or modified, as the old miners attempted to find continuations of the (presumably) rich mineral deposit that they removed almost totally from the natural cave and associated mined tunnels below.

Currently access to Lady Park Wood Cave is restricted, because the entrance lies within a designated and fenced-off reserve area. Thus, studies of the cave and its neighbours, which began casually in the late 1970s, have not been pursued more rigorously since the potential importance of the site as an aid to unravelling the long and complex history of speleogenesis and mineralization in the Symonds Yat area was appreciated. For this reason, the notes shown on the Lady Park Wood Cave survey and the observations below are generic and indicative rather than specific to individual valuable aspects of the cave.

Sites identified on the survey

1. Threshold/entrance area. Considering its position high above the Wye, and its proximity to other known or potential archaeological sites, including King Arthur's Cave on the north side of the river and Far Hearkening Rock on the south side, it is reasonable to assume that the cave threshold, at least, was visited and possibly used by early humans. It is now impossible to determine whether the deeper natural recesses were originally accessible or whether they were only revealed later, as tunnels were driven in search of iron-ore and (possibly) ochre. Any future study of the cave as a whole should consider the possibility that archaeological materials – both ancient and related to more recent historical activities – could be present among floor and alcove sediments.

2. Mined "cave" segments. A man-made or modified level some 100m in length extends from the entrance area northwards, running essentially parallel to natural cavities described below. This parallelism and other aspects of the relationships of mined to natural voids tends to suggest that a pre-existing natural passage, probably largely filled by iron-ore and/or ochre, was "mined out" by the early visitors, at least half of the way along the level. Inevitably natural irregularities were removed as access was improved to the more remote workings. A smaller tunnel a few metres to the south-west of the main entrance appears to be a failed trial, driven along the actual line of the known natural passages. The age of the workings has not been investigated, but evidence from elsewhere in the area would imply that the earliest (and easiest) ore removal could have been pre-historic. Whether the site was revisited and modified by more recent miners, or whether the artificial smoothing of parts of the level was carried out to improve access during Victorian times is unknown.

3. Natural cave segments. A well-marked but only partially open line of natural cavities runs from the inner end of the short failed trial level mentioned above for more than 100m towards the northnortheast. Lying at the same stratigraphical horizon, at least two separate but cross-joint-linked linear developments can be identified running along the strike and lying up and down dip of each other. The trial level probably followed the line of the uppermost natural cavities (marked "A" on the survey), whereas the first 50m or so of the main level followed a lower development, which continues ("B") in its original form beyond the point where the obvious modified or mined level (?"C") sidesteps slightly to the right. Though almost certain

that the final straight segment of the tunnel follows a third, still lower, natural level, this has not been confirmed. Other, intermediate, natural developments are visible between the main ones, and all probably reflect the guidance of development along strike-parallel (fold-related) joint fracture intersections with a rock bed that is particularly favourable to cave development.

4. Natural cave sediments. Much of the natural cave passage is floored by mixed sediment deposits, ranging from clay, through silt and sand to coarser breakdown material. In general the finer sediments are preserved in the sub-horizontal strike passages, whereas the steeper cross-joint related down-dip links contain only breakdown. Similar sediments are not present within the mined or modified levels, though locally their walls are lined with waste rock material. Here and in the natural cave passages some sediment is preserved as fillings in side-voids related to the bedding and to joints. None of the clastic sediments has been investigated with regard to primary properties, potential artefacts or animal remains, or with regard to relationships with the cave's mineral deposits.

5. Iron-ore minerals. Remnants of a once extensive fill of iron-ore minerals remain throughout the system, as small pockets, generally but not exclusively occupying bedding-related voids. The mode of occurrence and hence, almost certainly, the depositional mechanism seem to mirror those of the main Forest of Dean iron-ore deposits. The ores were high purity, having grown by a chemically driven precipitation process that led to the mineral literally crystalizing into pre-existing water-filled voids. Within this one small area examples can be found of haematite that has grown to form relatively small stalactitic clusters, botryoidal ("grape-like") masses and the more common "brush-ore", with a form that is evident from its name. Whereas the cave walls are tinged red locally, almost certainly as a side effect of being filled by the iron-rich waters at the time of mineralization, it is unlikely that the mining activity was aimed at recovering this ferrified wall rock. More likely the miners simply dug or scraped out the crystallized, high purity, haematite, taking their excavation back as far as the altered rock. Ore material has been noted in the smaller ramifications of the natural cave passages, with interesting implications for understanding the cave development history, but serious study of these relationships and relationships with clastic sediments are yet to be carried out.

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Most references are documented in Waltham et al., 1997.

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Appendix 1 – Cave Surveys

Cave Surveys:

GB Cavern & Charterhouse Swallet

Longwood Swallet

Manor Farm Swallet

Gough's Cave

Grebe Swallet

Lamb Leer Cavern

Shute Shelve Cavern

Swildons Hole

St Cuthberts Swallet (in three parts)

Wookey Hole

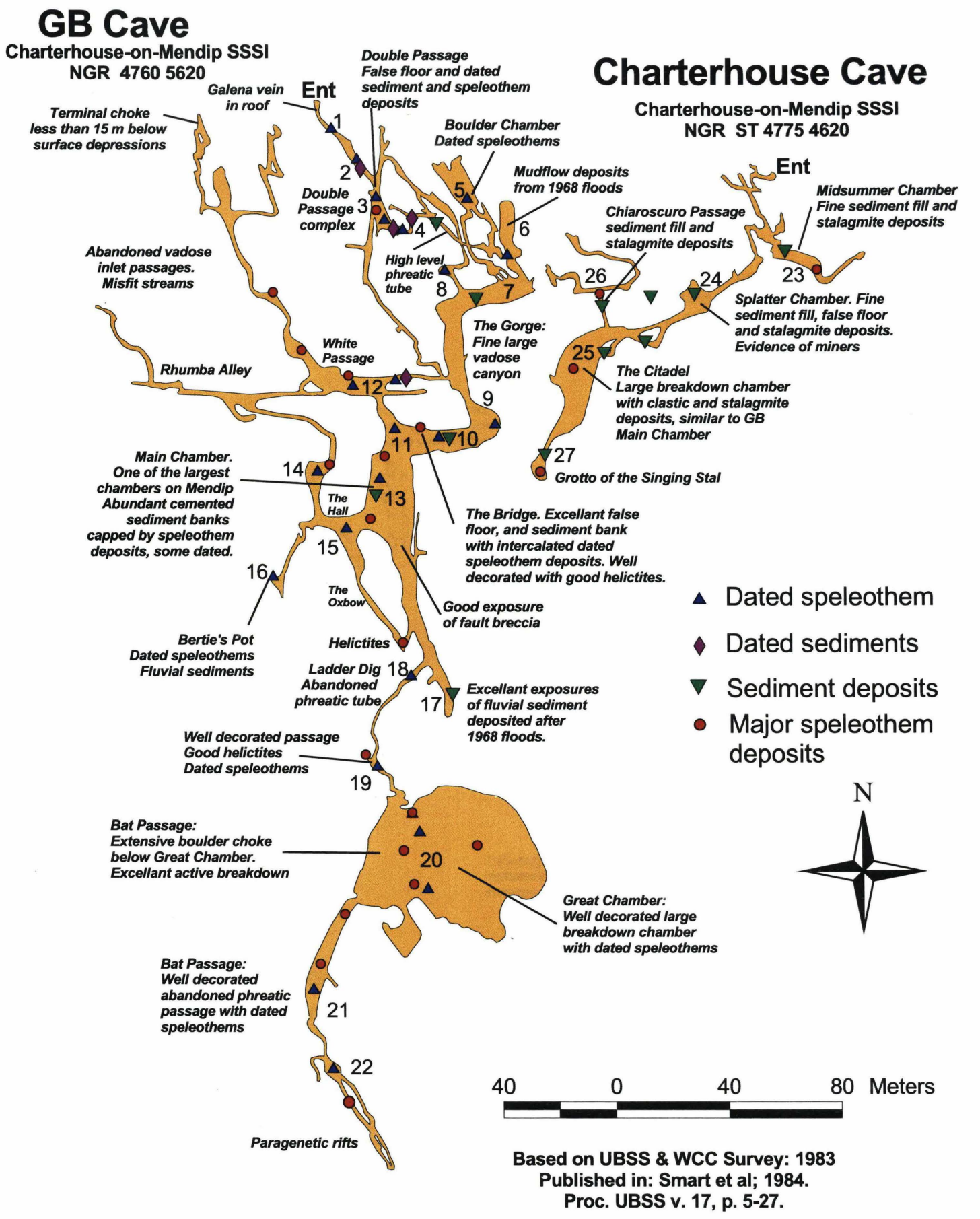
Stoke Lane Slocker

Fairy Cave Quarry Caves

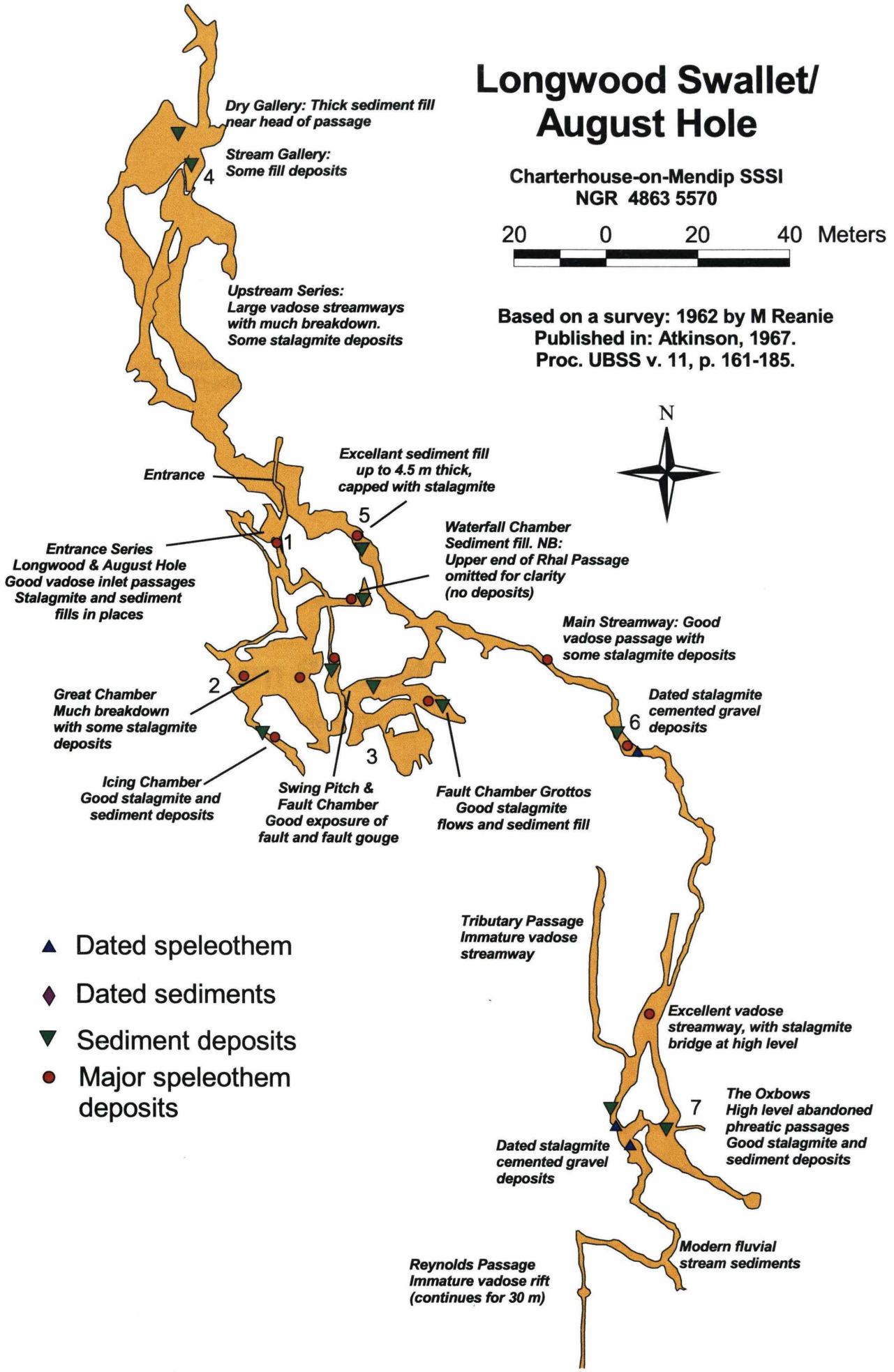
Banwell Bone & Stalactite Cave

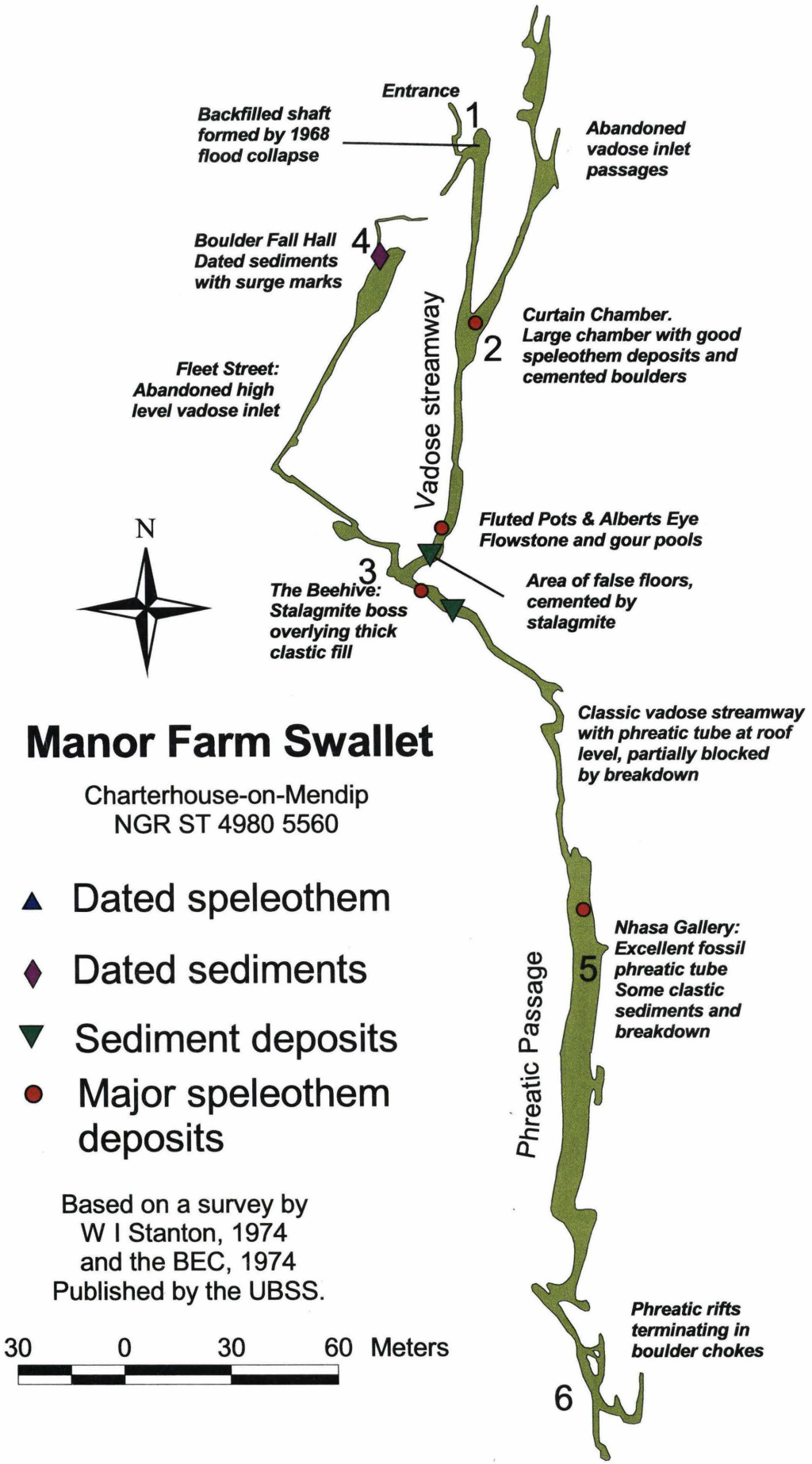
Slaughter Stream Cave (Wet Sink)

Lady Park wood Cave



Based on UBSS & WCC Survey: 1983
Published in: Smart et al; 1984.
Proc. UBSS v. 17, p. 5-27.


Longwood Swallet/
August Hole
Charterhouse-on-Mendip SSSI
NGR 4863 5570
20 0 20 40 Meters
Based on a survey: 1962 by M Reanie
Published in: Atkinson, 1967.
Proc. UBSS v. 11, p. 161-185.
N
Dry Gallery: Thick sediment fill near head of passage
Stream Gallery: Some fill deposits
4
Upstream Series: Large vadose streamways with much breakdown. Some stalagmite deposits
Entrance
Excellant sediment fill up to 4.5 m thick, capped with stalagmite
5
Waterfall Chamber Sediment fill. NB: Upper end of Rhal Passage omitted for clarity (no deposits)
Entrance Series Longwood & August Hole Good vadose inlet passages Stalagmite and sediment fills in places
1
Main Streamway: Good vadose passage with some stalagmite deposits
Great Chamber Much breakdown with some stalagmite deposits
2
Dated stalagmite cemented gravel deposits
6
Icing Chamber Good stalagmite and sediment deposits
Swing Pitch & Fault Chamber Good exposure of fault and fault gouge
3
Fault Chamber Grottos Good stalagmite flows and sediment fill
Tributary Passage Immature vadose streamway
Excellent vadose streamway, with stalagmite bridge at high level
The Oxbows High level abandoned phreatic passages Good stalagmite and sediment deposits
7
Dated stalagmite cemented gravel deposits
Modern fluvial stream sediments
Reynolds Passage Immature vadose rift (continues for 30 m)
Dated speleothem
Dated sediments
Sediment deposits
Major speleothem deposits



Manor Farm Swallet

Charterhouse-on-Mendip
NGR ST 4980 5560

- ▲ Dated speleothem
- ♦ Dated sediments
- ▼ Sediment deposits
- ● Major speleothem deposits

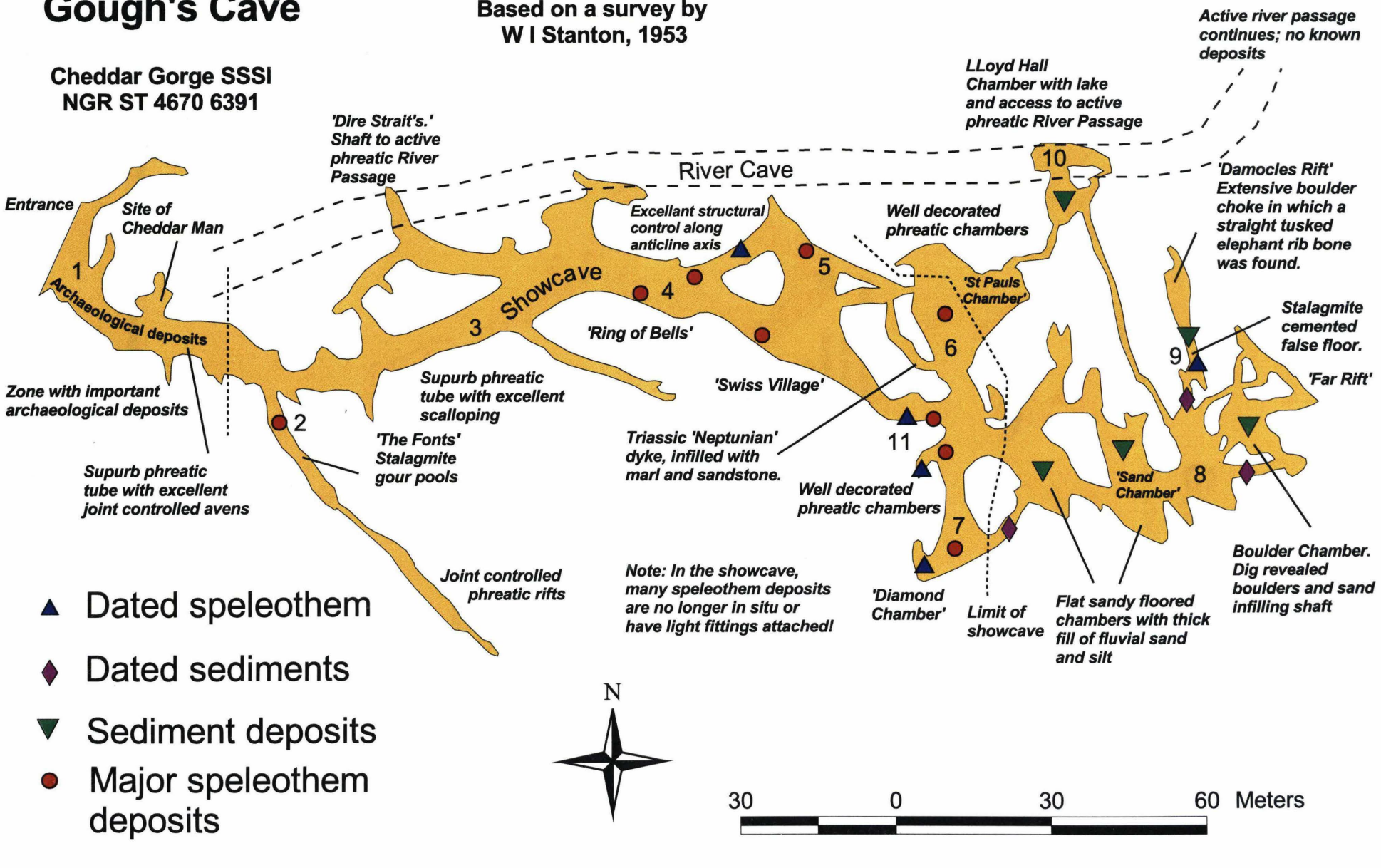
Based on a survey by
W I Stanton, 1974
and the BEC, 1974
Published by the UBSS.

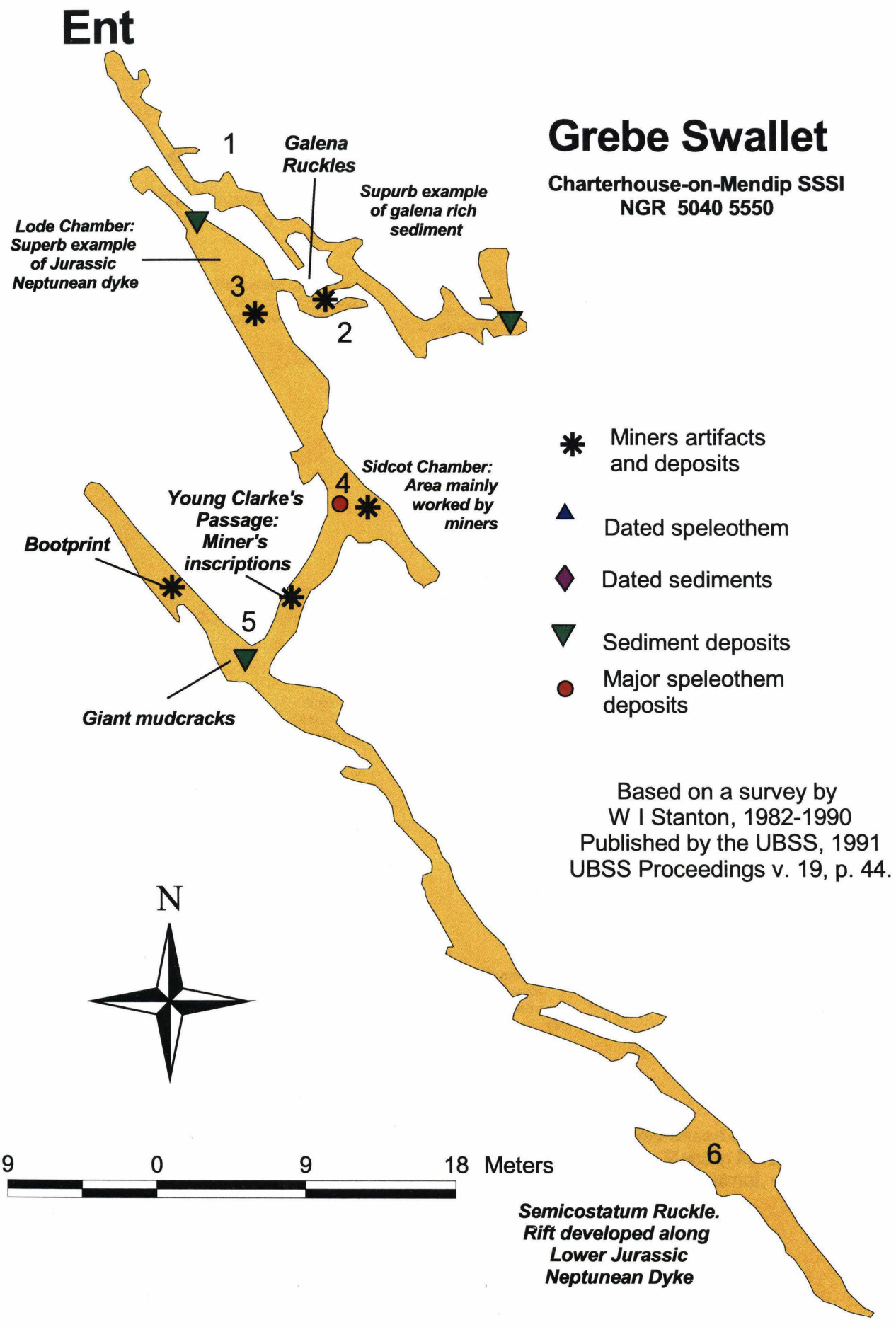
30 0 30 60 Meters

Gough's Cave

Based on a survey by W I Stanton, 1953

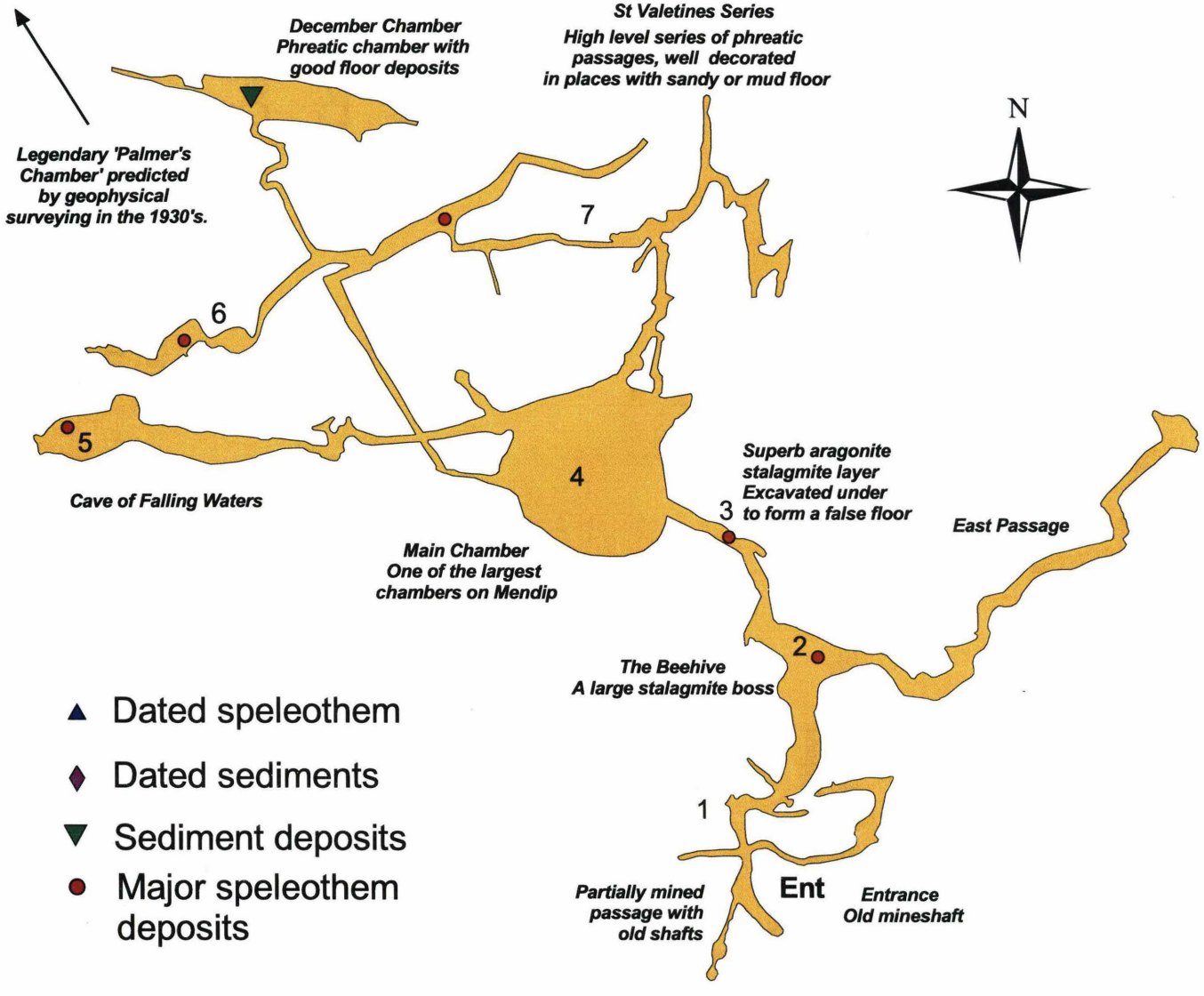
Cheddar Gorge SSSI
NGR ST 4670 6391




Ent
Grebe Swallet
Charterhouse-on-Mendip SSSI
NGR 5040 5550
1
Galena Ruckles
Supurb example of galena rich sediment
Lode Chamber: Superb example of Jurassic Neptunean dyke
3
2
4
Sidcot Chamber: Area mainly worked by miners
Young Clarke's Passage: Miner's inscriptions
Bootprint
5
Giant mudcracks
6
Semicostatum Ruckle. Rift developed along Lower Jurassic Neptunean Dyke
Miners artifacts and deposits
Dated speleothem
Dated sediments
Sediment deposits
Major speleothem deposits
Based on a survey by
W I Stanton, 1982-1990
Published by the UBSS, 1991
UBSS Proceedings v. 19, p. 44.
N
9 0 9 18 Meters

Lamb Leer Cavern

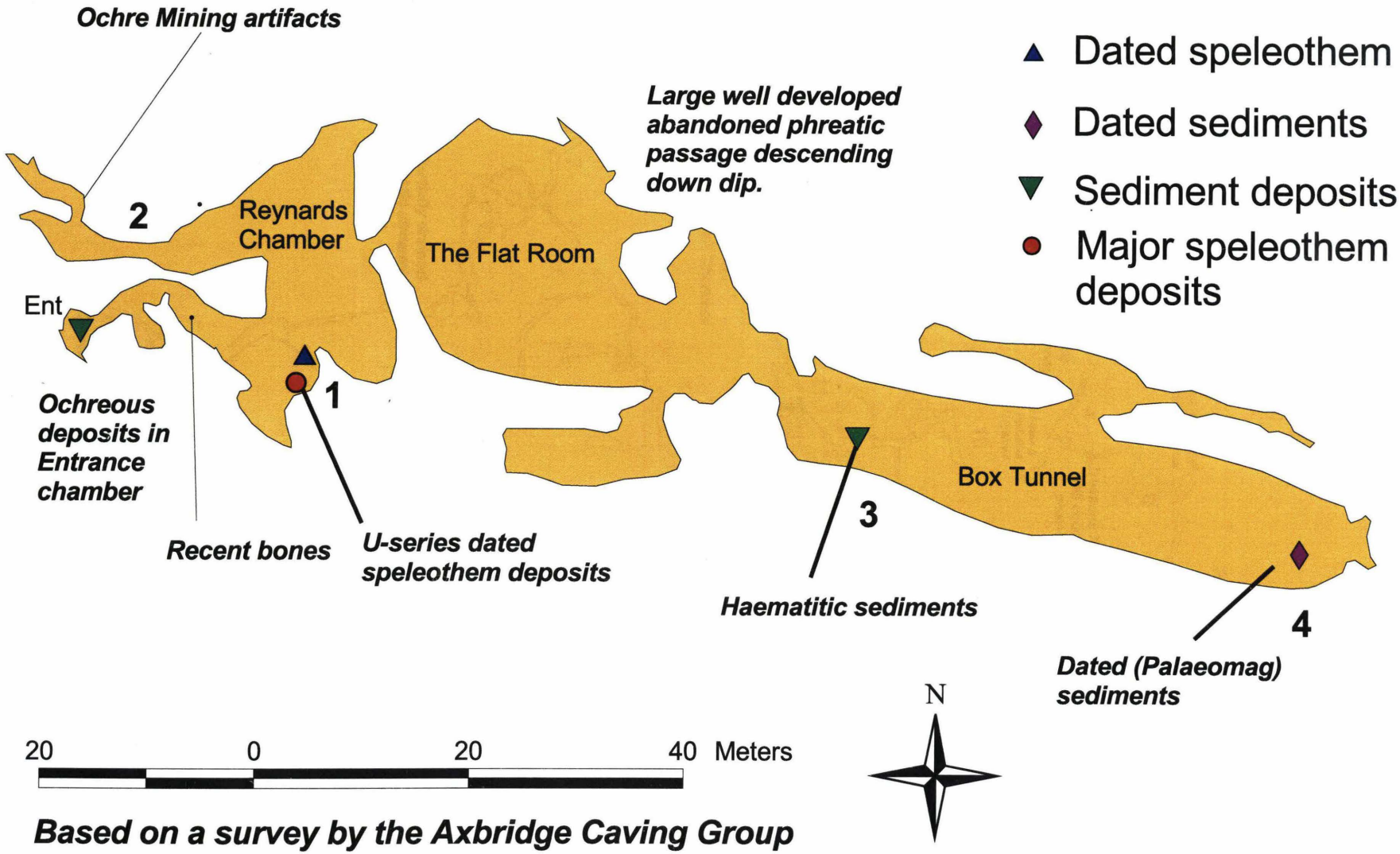
Lamb Leer SSSI, Chewton Mendip
NGR 5440 5500



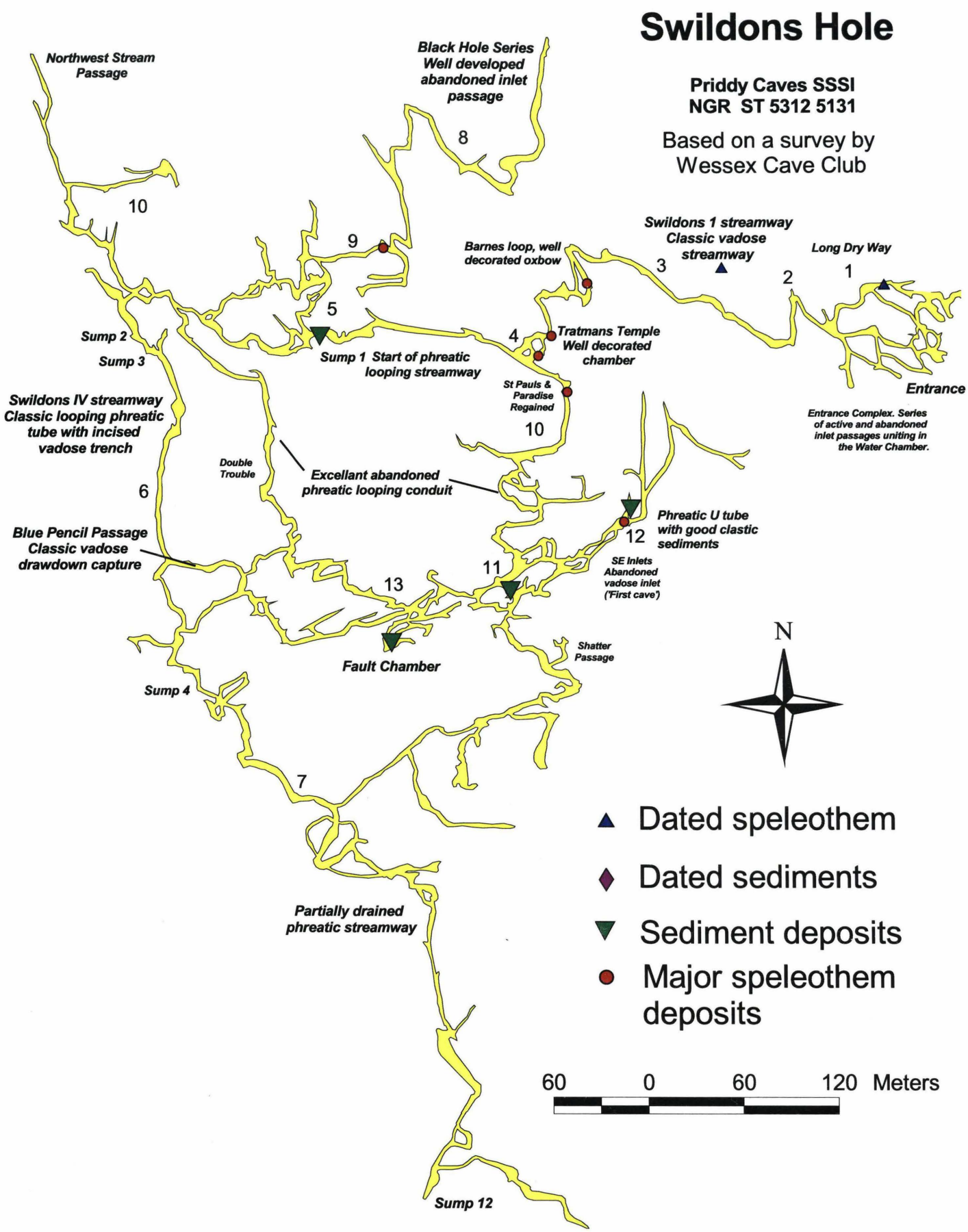
Survey based on that published in the Mendip Nature Research Committee Journal, v. 2, no. 1, 1966.

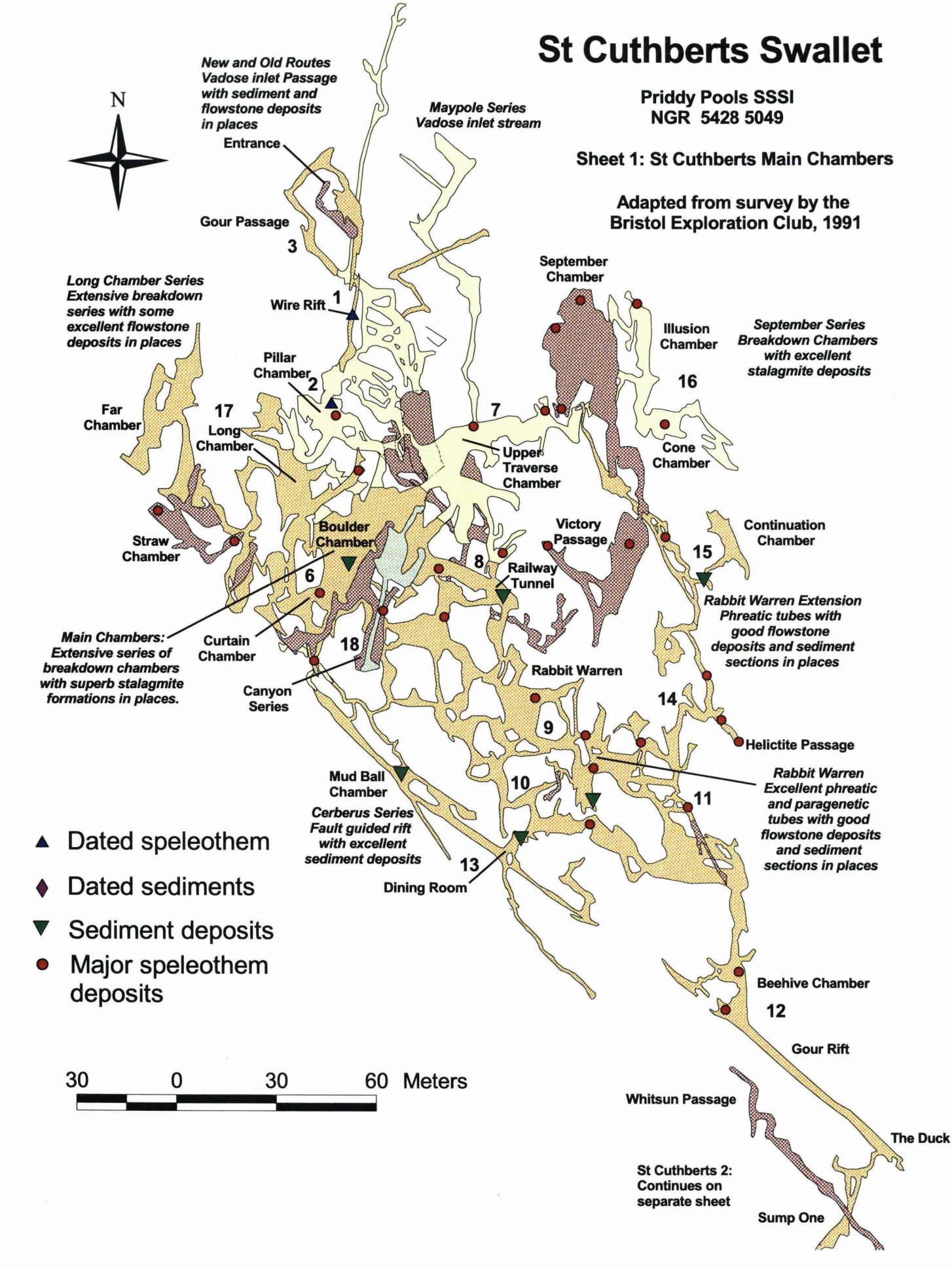
Shute Shelve Cavern

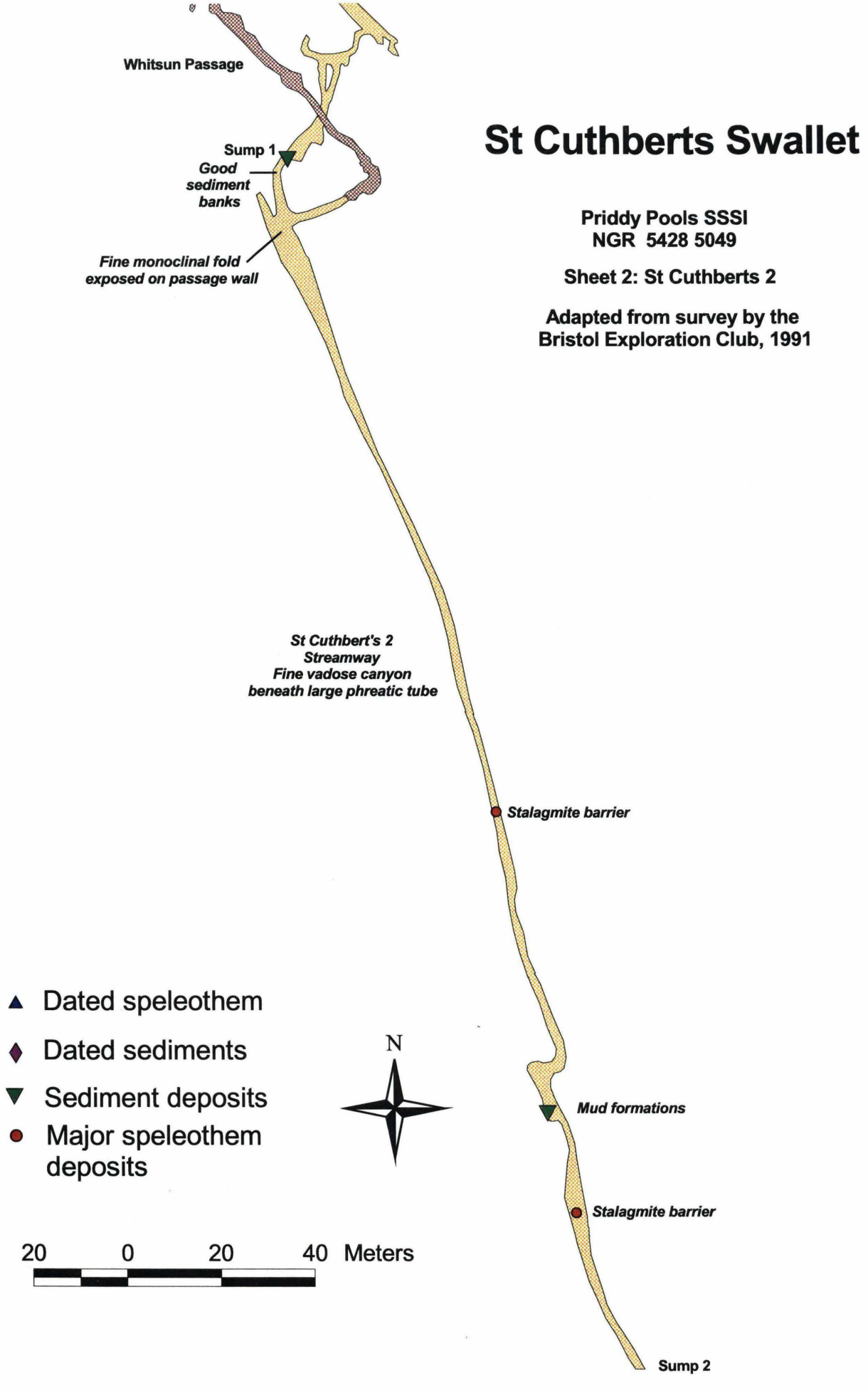
Crook Peak - Shute Shelve SSSI
NGR: ST 4242 5536
Shute Shelve Hill
Axbridge



Based on a survey by the Axbridge Caving Group


Swildons Hole
Priddy Caves SSSI
NGR ST 5312 5131
Based on a survey by
Wessex Cave Club
Northwest Stream Passage
Black Hole Series
Well developed abandoned inlet passage
8
10
9
Barnes loop, well decorated oxbow
Swildons 1 streamway
Classic vadose streamway
3
2
Long Dry Way
1
5
Sump 2
Sump 3
Sump 1 Start of phreatic looping streamway
4
Tratmans Temple
Well decorated chamber
St Pauls & Paradise Regained
10
Entrance
Entrance Complex. Series of active and abandoned inlet passages uniting in the Water Chamber.
Swildons IV streamway
Classic looping phreatic tube with incised vadose trench
Double Trouble
Excellant abandoned phreatic looping conduit
6
Phreatic U tube with good clastic sediments
12
Blue Pencil Passage
Classic vadose drawdown capture
SE Inlets
Abandoned vadose inlet
('First cave')
11
13
Shatter Passage
Fault Chamber
Sump 4
7
N
Dated speleothem
Dated sediments
Sediment deposits
Major speleothem deposits
Partially drained phreatic streamway
60 0 60 120 Meters
Sump 12


St Cuthberts Swallet
Priddy Pools SSSI
NGR 5428 5049
Sheet 1: St Cuthberts Main Chambers
Adapted from survey by the Bristol Exploration Club, 1991
N
New and Old Routes Vadose inlet Passage with sediment and flowstone deposits in places
Maypole Series Vadose inlet stream
Entrance
Gour Passage
3
Long Chamber Series Extensive breakdown series with some excellent flowstone deposits in places
Wire Rift
1
Pillar Chamber
2
September Chamber
Illusion Chamber
16
September Series Breakdown Chambers with excellent stalagmite deposits
Far Chamber
17
Long Chamber
7
Upper Traverse Chamber
Cone Chamber
Straw Chamber
Boulder Chamber
6
8
Railway Tunnel
Victory Passage
Continuation Chamber
15
Rabbit Warren Extension Phreatic tubes with good flowstone deposits and sediment sections in places
Main Chambers: Extensive series of breakdown chambers with superb stalagmite formations in places.
Curtain Chamber
18
Canyon Series
Rabbit Warren
9
14
Helictite Passage
Mud Ball Chamber
10
11
Rabbit Warren Excellent phreatic and paragenetic tubes with good flowstone deposits and sediment sections in places
Cerberus Series Fault guided rift with excellent sediment deposits
13
Dining Room
Beehive Chamber
12
Gour Rift
Whitsun Passage
The Duck
St Cuthberts 2: Continues on separate sheet
Sump One
Dated speleothem
Dated sediments
Sediment deposits
Major speleothem deposits
30 0 30 60 Meters



St Cuthberts Swallet

Priddy Pools SSSI
NGR 5428 5049

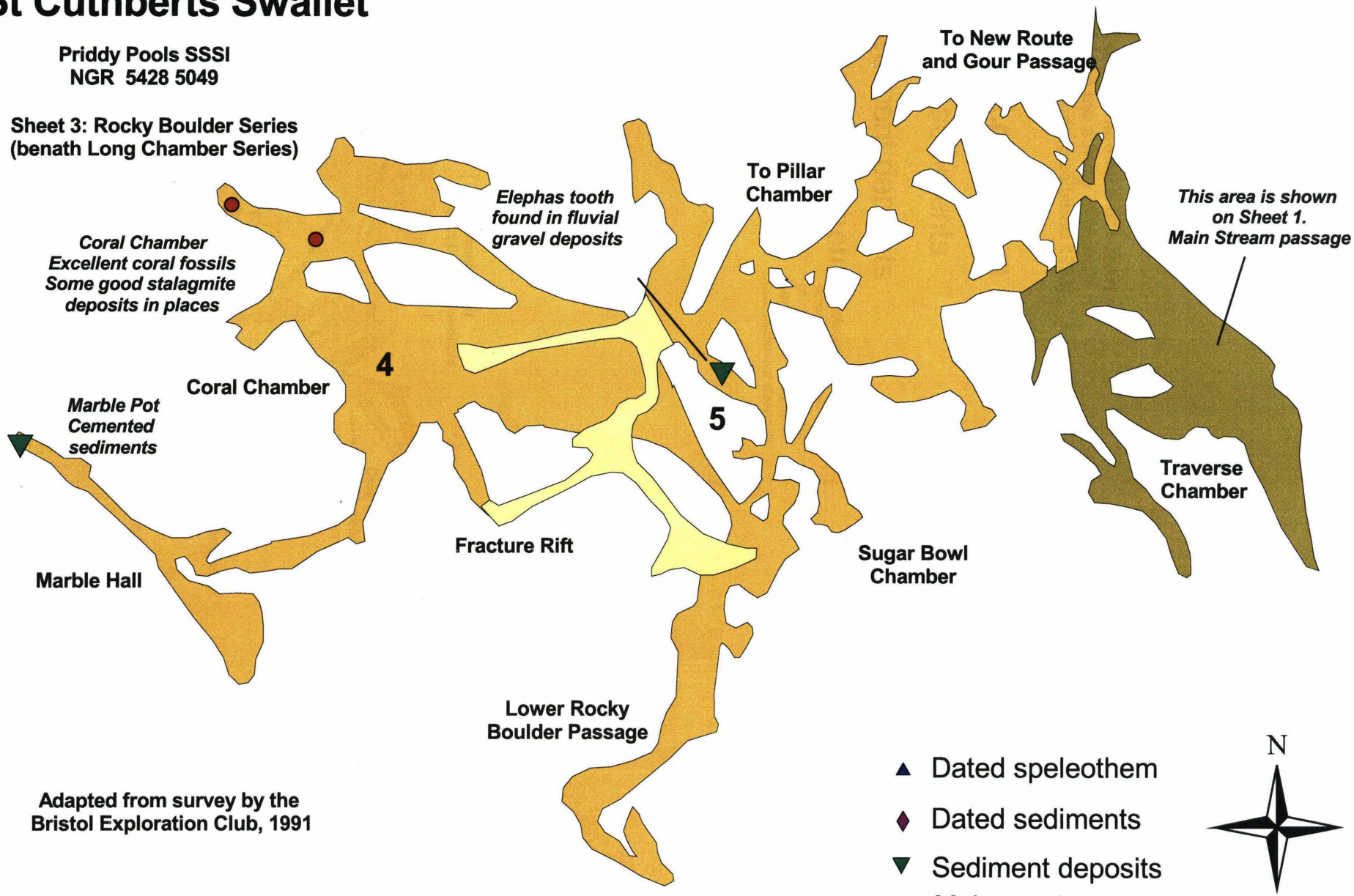
Sheet 2: St Cuthberts 2

Adapted from survey by the Bristol Exploration Club, 1991

St Cuthberts Swallet

Priddy Pools SSSI
NGR 5428 5049

Sheet 3: Rocky Boulder Series
(benath Long Chamber Series)



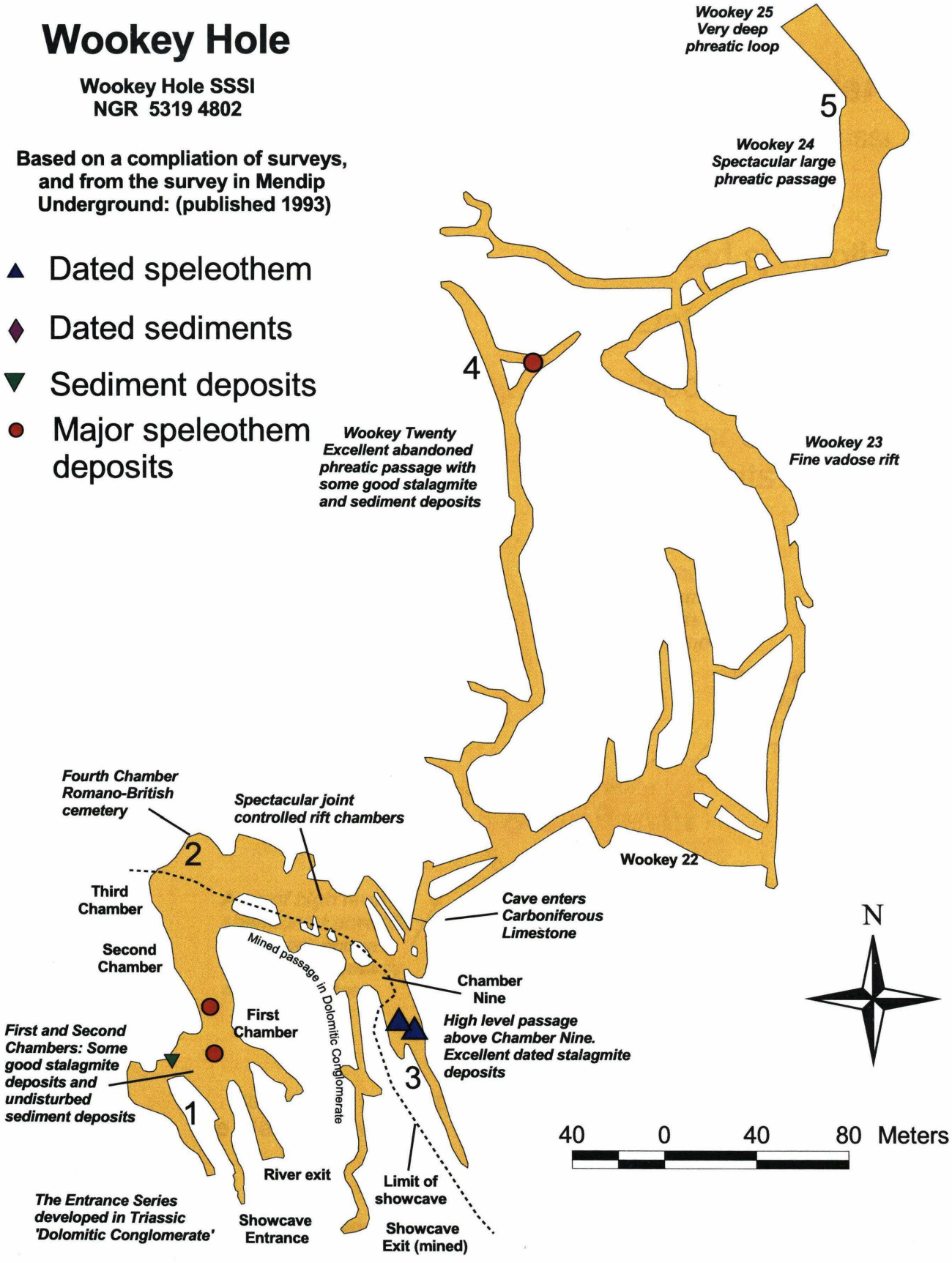
Adapted from survey by the
Bristol Exploration Club, 1991

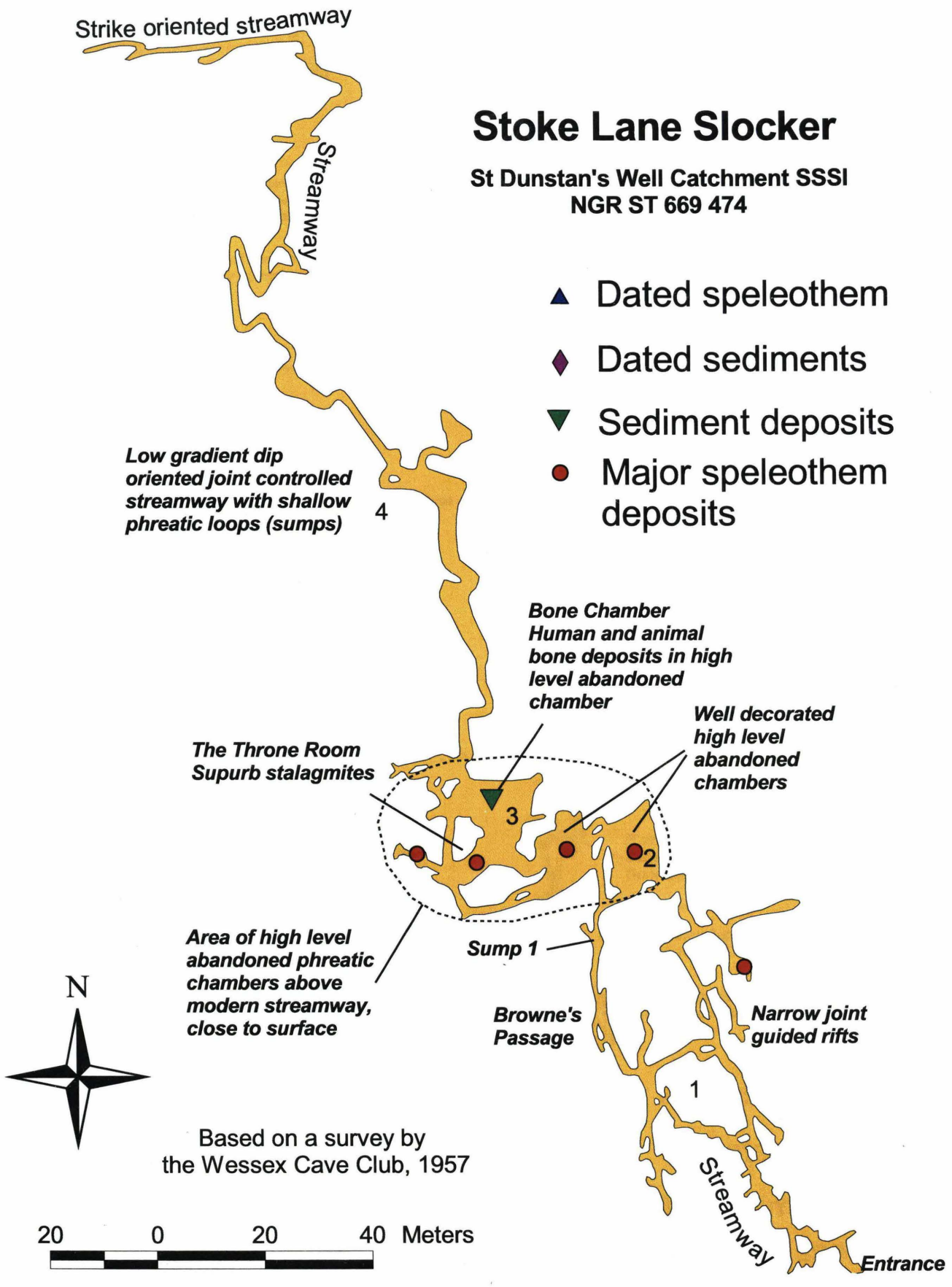
Wookey Hole

Wookey Hole SSSI
NGR 5319 4802

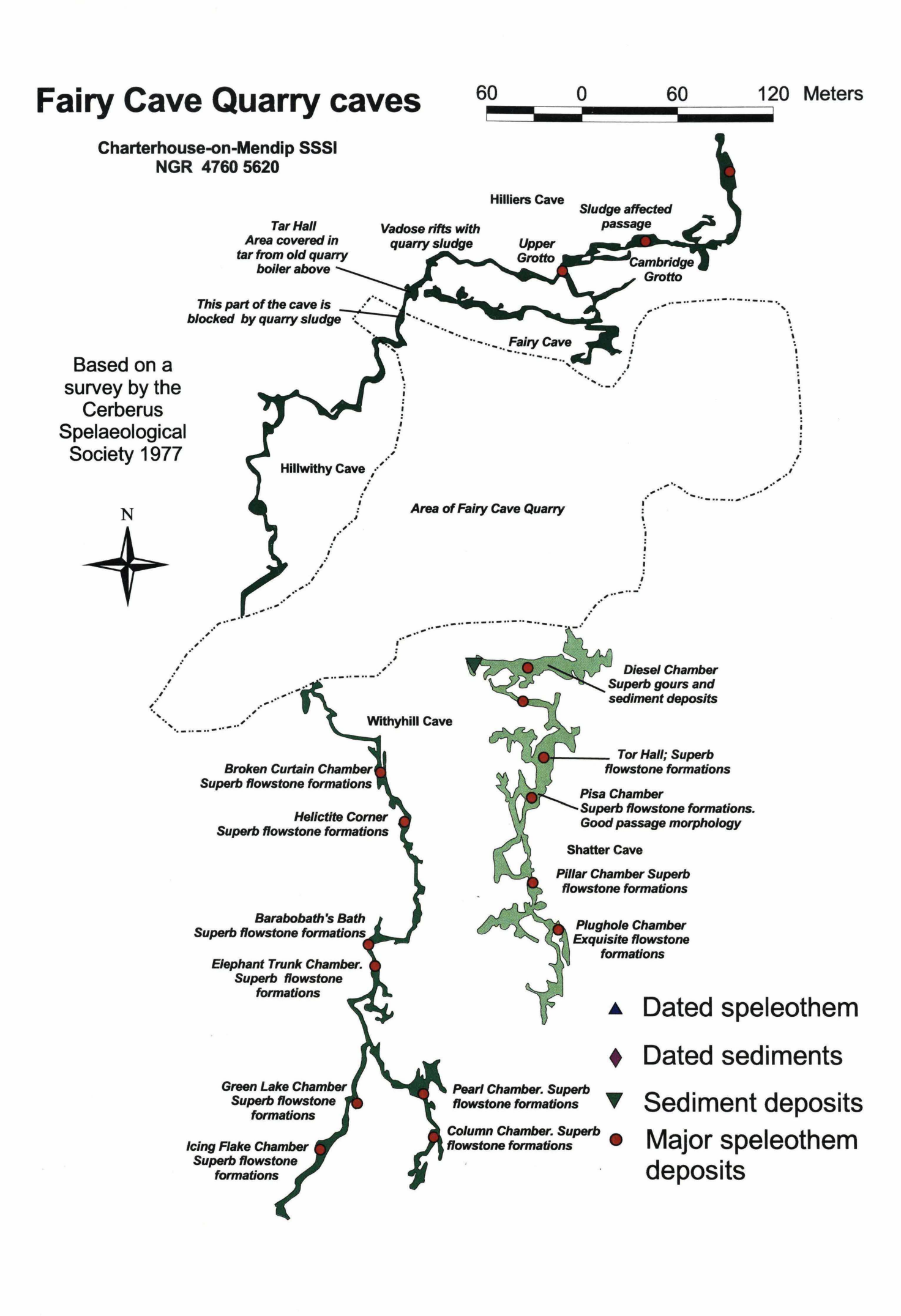
Based on a compliation of surveys, and from the survey in Mendip Underground: (published 1993)

- ▲ Dated speleothem
- ♦ Dated sediments
- ▼ Sediment deposits
- ● Major speleothem deposits



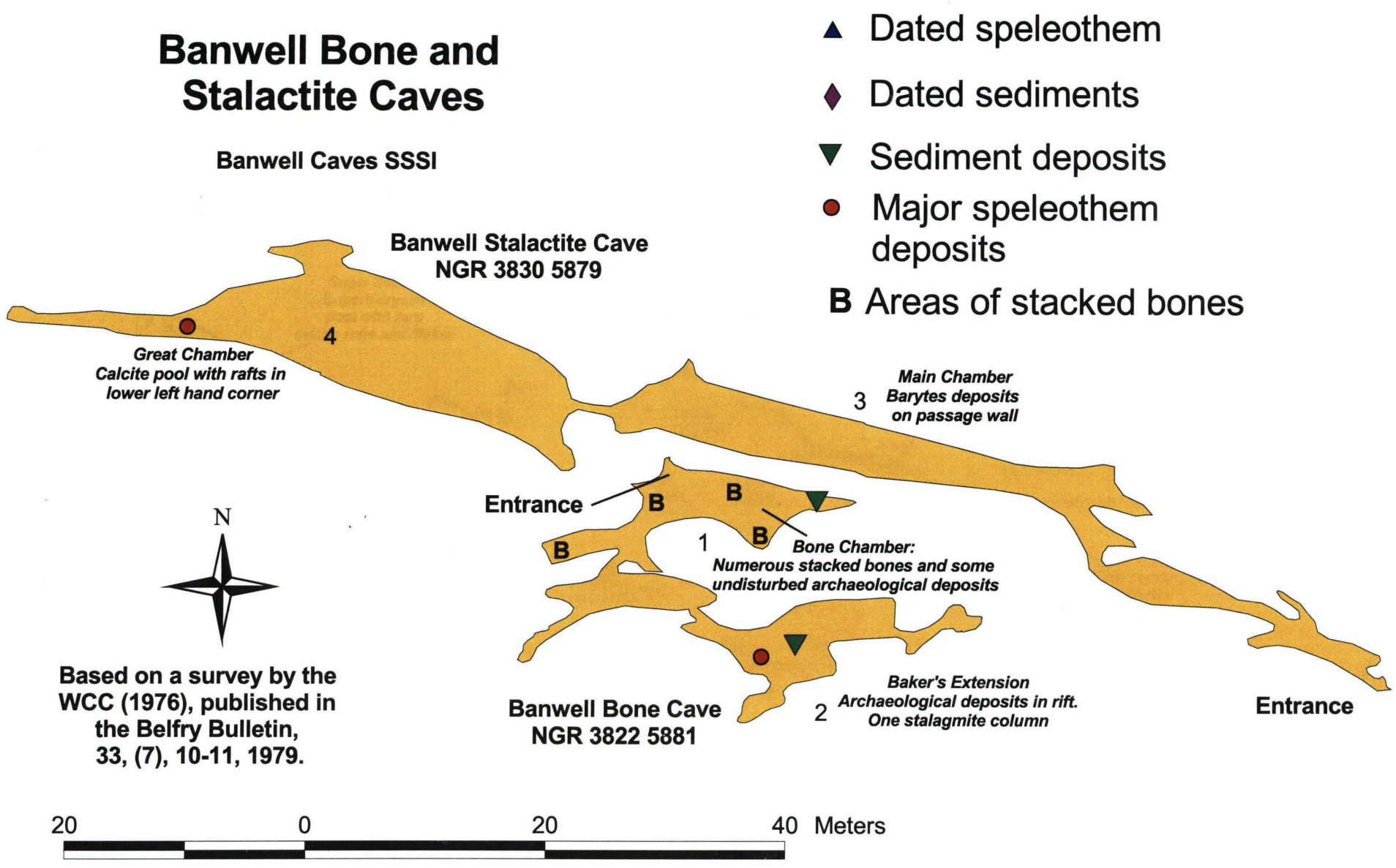

Strike oriented streamway
Streamway
Stoke Lane Slocker
St Dunstan's Well Catchment SSSI
NGR ST 669 474
Dated speleothem
Dated sediments
Sediment deposits
Major speleothem deposits
Low gradient dip oriented joint controlled streamway with shallow phreatic loops (sumps)
4
Bone Chamber
Human and animal bone deposits in high level abandoned chamber
Well decorated high level abandoned chambers
The Throne Room
Supurb stalagmites
3
2
Area of high level abandoned phreatic chambers above modern streamway, close to surface
Sump 1
Browne's Passage
Narrow joint guided rifts
1
N
Based on a survey by the Wessex Cave Club, 1957
20 0 20 40 Meters
Streamway
Entrance

Fairy Cave Quarry caves



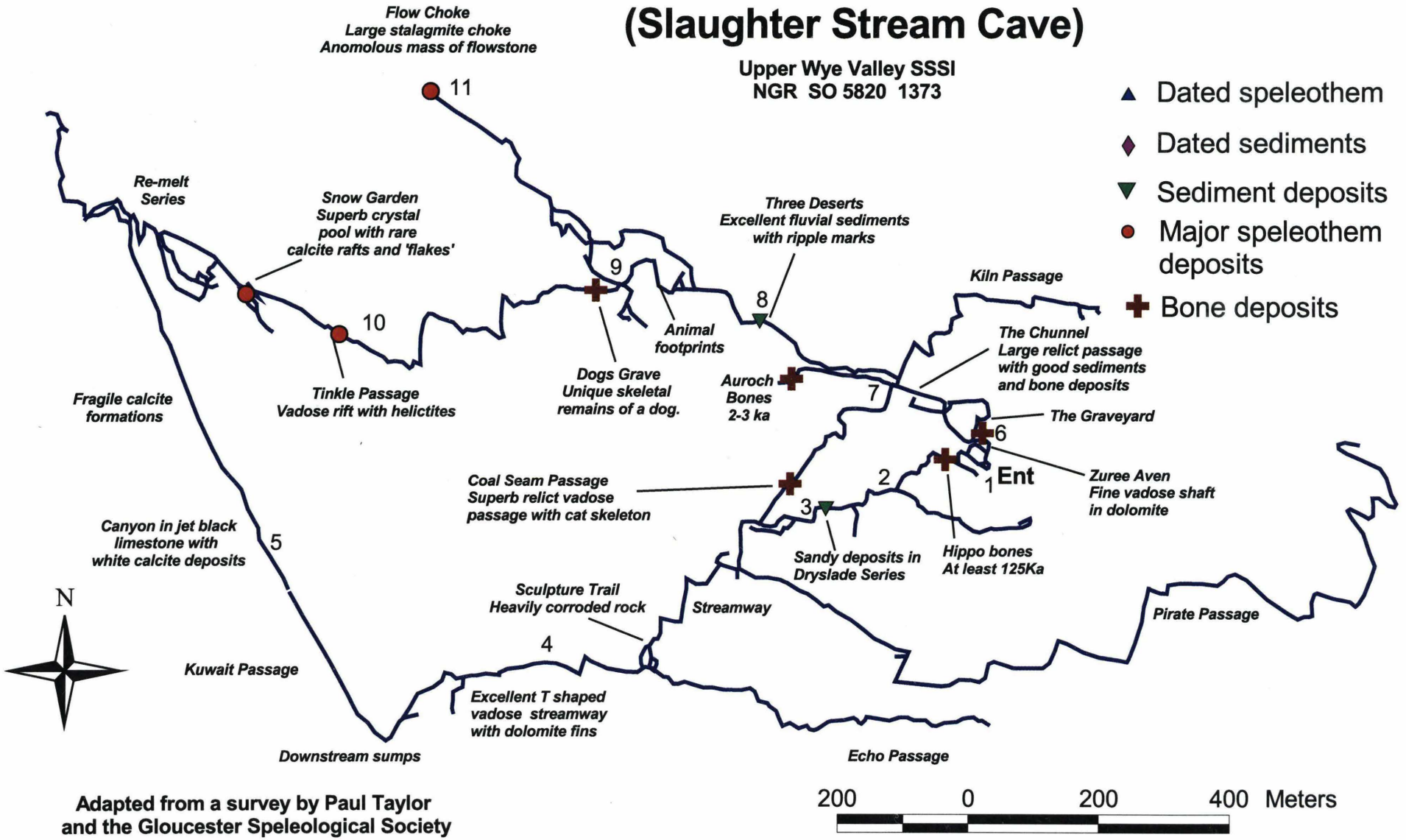
Banwell Bone and Stalactite Caves

Banwell Caves SSSI



Wet Sink
(Slaughter Stream Cave)

Upper Wye Valley SSSI
NGR SO 5820 1373

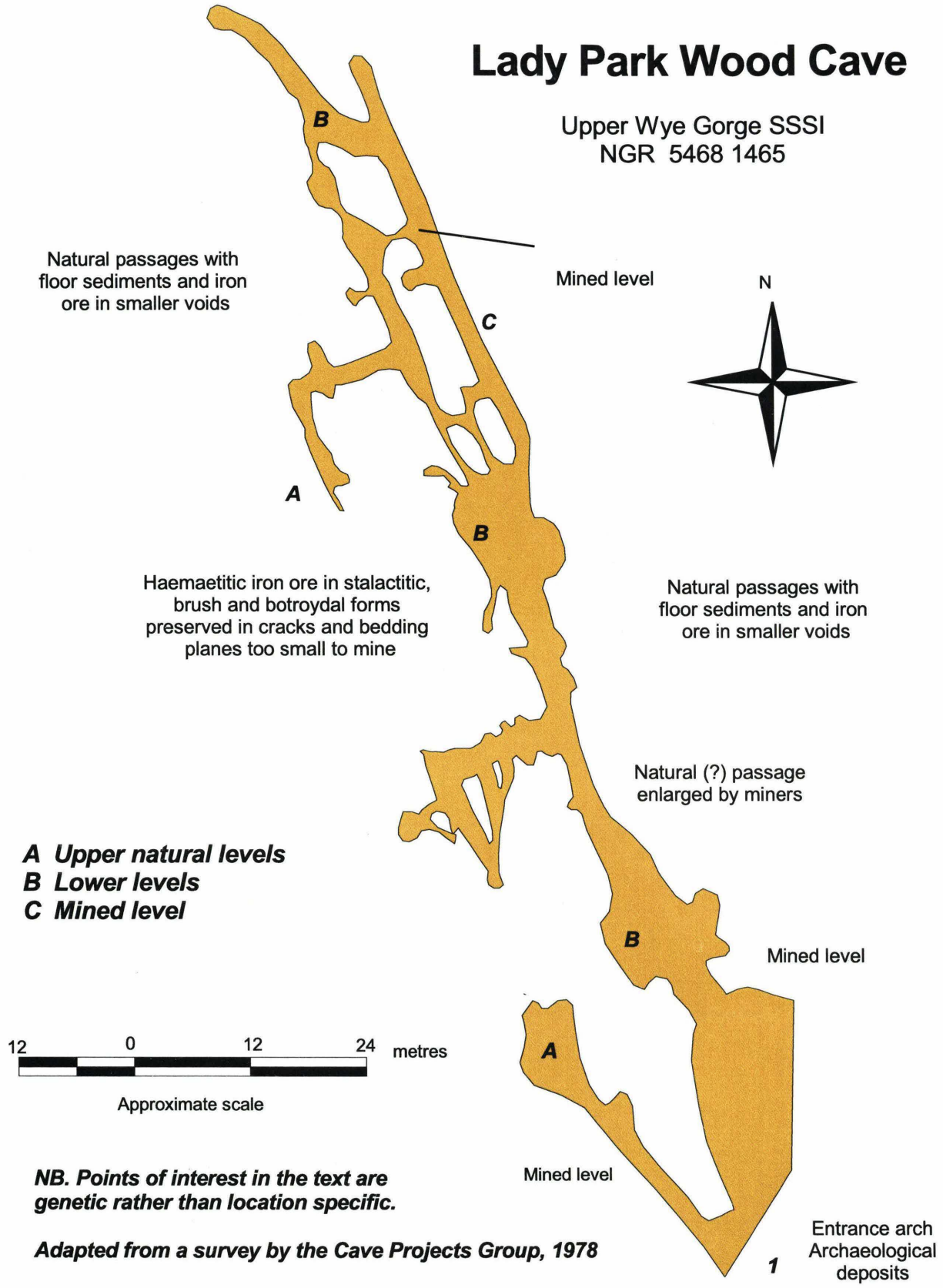


- ▲ Dated speleothem
- ♦ Dated sediments
- ▼ Sediment deposits
- ● Major speleothem deposits
- ✚ Bone deposits

Adapted from a survey by Paul Taylor and the Gloucester Speleological Society

Lady Park Wood Cave

Upper Wye Gorge SSSI
NGR 5468 1465



A Upper natural levels
B Lower levels
C Mined level

12 0 12 24 metres

Approximate scale

NB. Points of interest in the text are genetic rather than location specific.

Adapted from a survey by the Cave Projects Group, 1978